



Food and Agriculture
Organization of the
United Nations

Sustainable value chains for sustainable food systems

A workshop of the FAO/UNEP
Programme on Sustainable Food Systems



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A workshop of the FAO/UNEP
Programme on Sustainable Food Systems
Rome, 8–9 June 2016

Edited by

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Acknowledgements

The joint FAO/UNEP workshop on Sustainable Value Chains for Sustainable Food Systems was organized by the Sustainable Food Systems Programme and held on 8–9 June 2016 at FAO headquarters in Rome, Italy.

We would like to extend our special thanks to all the participants for their contributions and papers, as well as to the chairs of the sessions: Elliot M. Berry, Roberto Azofeifa, Gábor Figeczky, Elise Golan, Flavio Paoletti, Maryam Rahmanian, Anne Roulin and James Lomax. In addition, we would also like to thank David Neven, Ayurzana Puntsagdavaa, Benjamin Doin and Dario Cossu for their assistance with the webinar. We are particularly grateful to the Swiss Federal Office of Agriculture for their generous support in the preparation of this document.

Agenda

FAO is organizing with UNEP and the support of Switzerland a Workshop on Sustainable Value Chains for Sustainable Food Systems that will take place at FAO headquarters in Rome, Italy, on 8 and 9 June 2016. The workshop contributes to the Sustainable Food Systems Programme of the 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP SFS Programme). It will build upon and link with previous workshops on “Voluntary Standards for Sustainable Food Systems: Challenges and Opportunities”¹ in 2013 and on “Knowledge and Information for Sustainable Food Systems”² in 2014, towards implementation, including by stimulating concrete partnerships between 10YFP SFS Programme partners as well as further interested participating organizations. The workshop aims at better framing the notion of “sustainable value chain”.

This workshop will examine potential contributions of the organization, functioning and governance of food value chains to the sustainability of food systems, with a particular attention to environmental issues, including resource use efficiency and biodiversity, economic and social issues, including gender. It will consider resource use efficiency (energy, water, etc.), including potential uses of coproducts and by products, reduction of losses, etc., along food chains. It will also consider how the very organization of food value chains can improve sustainability as well as employment and income generation opportunities in rural areas, particularly for women. It will consider the technologies and tools as well as the institutional and organizational settings, including legal instruments such as contracts that can improve environmental, economic and social impacts.

Wednesday, 8 June 2016

- 14:30 – 14:45 Opening remarks
Ren Wang, Assistant Director-General, Agriculture and
Consumer Protection Department, FAO
Adrian Aebi, Assistant Director General of FOAG
- 14.45 – 15.30 SESSION 1: RESOURCE USE EFFICIENCY, INCLUDING
RECYCLING, REDUCING FOOD LOSSES AND WASTE
Chair: Elliot M. Berry, Hebrew University Hadassah Medical School
- 14.45 – 14.55 The case study methodology to assess food loss and waste
Bin Liu, FAO
- 14.55 – 15.05 Food losses and wastage across the milk value chain in Pakistan
Anne Roulin, Nestlé

¹ <http://www.fao.org/docrep/019/i3421e/i3421e.pdf>

² <http://www.fao.org/3/a-i5373e.pdf>

- 15.05 – 15.15 Towards zero-waste and sustainable food production using human inedible agroproducts including food loss and waste as animal feed
Harinder P.S. Makkar, FAO
- 15.15 – 15.30 Discussion
- 15.30 – 16.30 **SESSION 2: BIODIVERSITY FROM PRODUCTION TO DIETS**
Chair: Roberto Azofeifa, Ministry of Agriculture and Livestock of Costa Rica
- 15.30 – 15.40 The LEAP principles for the assessment of livestock impacts on biodiversity
Felix Teillard, FAO
- 15.40 – 15.50 Biodiversity in standards and labels for the food industry
Patrick Trötschler, Lake Constance Foundation
- 15.50 – 16.00 Mountain products initiative
Rosaura Romeo, The Mountain Partnership Secretariat, FAO
- 16.00 – 16.10 Slow Food Presidia: an opportunity for the future of the mountains
Ludovico Roccato, Slow Food Foundation for Biodiversity
- 16.10 – 16.30 Discussion
- 16.30 – 16.45 Coffee break
- 16.45 – 17.55 **SESSION 3: FOOD VALUE CHAINS AND RURAL/ TERRITORIAL DEVELOPMENT**
Chair: Gábor Figeczky, IFOAM
- 16.45 – 16.55 Food self-provisioning – the role of non-market exchanges in sustainable food supply: experiences from Hungary
Bálint Balázs, Environmental Social Science Research Group
- 16.55 – 17.05 Regional Food Innovation Labs from farm to fork
Frank Mechielsen, Hivos
- 17.05 – 17.15 Innovative markets for sustainable agriculture: exploring how innovations in market institutions encourage sustainable agriculture in developing countries
Allison Loconto and Anne Sophie Poisot, French National Institute for Agricultural Research and FAO
- 17.15 – 17.25 Territorial food value chain for sustainable food systems: initiative from the French National Food Programme
Vincent Gitz, Ministry of Agriculture of France
- 17.25 – 17.35 The new Nordic diet as a prototype for regional sustainable diets
Susanne Bügel, University of Copenhagen
- 17.35 – 17.55 Discussion

Thursday, 9 June 2016

- 09.00 – 10.45 **SESSION 4: INCLUSIVE FOOD VALUE CHAINS: CREATING AND DISTRIBUTING VALUE, SOCIAL AND GENDERED ALONG THE CHAINS FOR SUSTAINABLE FOOD SYSTEMS**
Chair: Elise Golan, Office of the Chief Economist, US Department of Agriculture
- 09.00 – 09.10 FAO's approach on gender-sensitive and sustainable food value chains
Anna Lentink, FAO
- 09.10 – 09.20 Building sustainable and inclusive small holder farming food value chains in Cameroon; Case of the North West Farmers' Organization
Stephen Ngenchi, Community Partners for Sustainable Development
- 09.20 – 09.30 Geographical indications economic impacts: evidence from cases studies
Catherine Teyssier and Emilie Vandecandelaere, FAO
- 09.30 – 09.45 Discussion
- 09.45 – 09.55 Smallholder farmer participation in a modernizing food system - insights from the dairy value chain in Zambia
David Neven, FAO
- 09.55 – 10.05 Project: rural competitiveness
Ruth Xiomara Cubas Cantarero, National Council for Sustainable Development of Honduras
- 10.05 – 10.15 The World Banana Forum: a multistakeholder platform to develop practical guidance for sustainable banana value chains
Victor Prada and Pascal Liu, FAO/The World Banana Forum
- 10.15 – 10.30 Discussion
- 10.30 – 10.45 Coffee break
- 10.45 – 12.00 **SESSION 5: INSTITUTIONS, MARKETS AND CONTRACTS FOR SFS ALONG FOOD VALUE CHAINS**
Chair: Flavio Paoletti, CREA
- 10.45 – 10.55 What might an "agroecological" value chain look like?
Allison Loconto and Emilie Vandecandelaere, French National Institute for Agricultural Research and FAO
- 10.55 – 11.05 What kinds of markets support agroecological production systems?
Jimena Gomez and Maryam Rahmanian, FAO
- 11.05 – 11.15 Campagna Amica farmers' markets network: economic and social sustainability – is the community back on the market (places)?
Toni De Amicis, Elisabetta Montesissa and Corrado Finardi, Institution Campagna Amica - Coldiretti Italian Farmers
- 11.15 – 11.25 Towards a definition of short value chains
Pilar Santacoloma, FAO
- 11.25 – 11.35 Why a continental strategy for geographical indications (GIs)?
Diana Akullo, African Union Commission

11.35 – 12.00	Discussion
12.00 – 13.00	SESSION 6: CATERING AND HOSPITALITY Chair: Maryam Rahmanian, FAO
12.00 – 12.10	The role of sustainable horeca (hotels, restaurants and catering) for sustainable lifestyles. Identification of challenges and future work Carola Strassner, Muenster University of Applied Science
12.10 – 12.20	The catering sector as sustainable value chain Natascha Kooiman, Smaackmakers
12.20 – 12.30	Local procurement for school feeding programmes Luana Swensson, Israel Klug, Siobhan Kelly, Florence Tartanac, FAO
12.30 – 12.40	REDUCE: Research, Education and Communication for Sustainable School Catering Matteo Boschini, University of Bologna
12.40 – 13.00	Discussion
13.00 – 14.30	Lunch Break
14.30 – 15.15	SESSION 7: COORDINATION OF ACTORS ALONG FOOD VALUE CHAINS Chair: Anne Roulin, Nestlé
14.30 – 14.40	Learning from the organic food system as a model for sustainable food systems Johannes Kahl, Organic Food System Programme (OFSP)
14.40 – 14.50	Voluntary certification system on good agricultural practices for fresh consumption products Roberto Azofeifa, Ministry of Agriculture and Livestock of Costa Rica
14.50 – 15.00	Ireland's National Sustainability Programme Origin Green Cliodhnagh Conlon, Origin Green
15.00 – 15.15	Discussion
15.15 – 15.45	SESSION 8: COMMUNICATION TO CONSUMERS Chair: James Lomax, UNEP
15.15 – 15.25	Consumer communications of product level sustainability information Jim Bracken, GS1 AISBL
15.25 – 15.35	The Sustainability Consortium: theory of change and first results Koen Boone, Wageningen UR
15.35 – 15.45	Discussion
15.45 – 15.55	Official launch of the knowledge platform: sustainable food value chains
15.55 – 16.10	Wrap up and conclusions Alexandre Meybeck, FAO

Summary report and main conclusions

The workshop considered potential contributions of the organization, functioning and governance of food value chains to the sustainability of food systems. The various sessions were focused on different aspects in order to integrate perspectives of various actors, the private sector and civil society along with contributions from FAO, research and academia.

The first session was devoted to resource use efficiency, including recycling and reducing food loss and waste. FAO presented its case study methodology to assess food loss and waste and identify its causes. Nestlé conveyed the results of a study on the milk value chain in Pakistan ranging from small to large farms and including collection, processing and distribution right through to waste by the final consumer. FAO provided an analysis of various technologies available that enhance digestibility of crop residues and by-products and also increase their nutrient availability to animals, as well as illustrating the synergies of increased livestock productivity and income of farmers, the decrease of environmental pollutants and the provision of better social outcomes. The discussion recognized the importance of the various studies and noted that resource efficiency needs to be considered along the food value chains, in terms of the opportunities, the challenges and the constraints. It also pointed out that the SFS programme can play a role to support actors to overcome them. Building upon the impressive results obtained in the dairy sector in Pakistan, after 15 years, participants also highlighted that time is a fundamental component of any initiative, in order to engage farmers as well as consumers, and achieve concrete results.

The second session considered biodiversity issues from production to diets. The FAO-hosted Livestock Environmental Assessment and Performance (LEAP) partnership shared their views and principles developed for the assessment of livestock impact on biodiversity. Lake Constance Foundation and the Global Nature Fund provided insight into the recommendations they have compiled for more biodiversity criteria in standards and quality labels for the food industry. The initiative by the Mountain Partnership Secretariat and FAO on the creation of a voluntary certification scheme for mountain products aims to communicate the values of a mountain product, enabling the consumers to make a more informed purchase and the producers to receive fair compensation. Slow Food presented the socio-cultural, agri-environmental and economic sustainability of Slow Food Presidia including the importance of dietary diversity (including cultural aspects). The narrative label was presented that explains why each product is different providing various information. It was pointed out that different products call for different types of information. The discussion highlighted that there is a need to integrate biodiversity along the food chain in order to be more sustainable in the long term. It looked at what different actors can do to facilitate this so that biodiversity can be incorporated into a systems approach integrating the three dimensions of sustainability.

The third session was dedicated to food value chains and rural/territorial development. The experience from the Environmental Social Science Research Group on food self-provisioning and the role of non-market exchanges in sustainable food supply in Hungary showed some of the motivations for food self-provisioning as experienced by producer-consumers. Hivos explained the results of the Food Innovation Lab in Uganda and discussed the challenges and synergies between vertical value chain thinking and horizontal territorial development thinking with farmers and consumers at the centre. FAO and the National Institute for Agronomic Research provided insight on the survey they undertook of innovative approaches that enable markets to act as incentives in the transition towards sustainable agriculture in developing countries. The presentation on the French National Programme for Food, which is led by the French Ministry of Agriculture, Agrifood and Forestry and associates 14 other ministries, focused on the subnational (regional) levels and on an innovative disposition called “territorial food projects”, introduced in the law for the future of agriculture, food and forests of 14 October 2014. It showed how a set of initiatives with a territorial approach could contribute towards building sustainable food value chains. The presentation on the New Nordic Diet retraced its history and how various actors were involved in its development. It concluded that the New Nordic Diet can be used as an example of a regional diet to develop appropriate models in any region. The discussion highlighted the need to bridge the gap between various actors, private vs public, global vs local etc. Collaboration is key in order to build the trust needed to develop adequate policies for the future.

The fourth session was devoted to inclusive food value chains: creating and distributing value, social and gendered aspects along the chains for sustainable food systems. Addressing gender in agricultural development programmes, in general and along the food value chain, is an important theme, elaborated by FAO through an approach on gender-sensitive and sustainable food value chains with reference to the FAO Multi-Partner Programme Support Mechanism. A case study from Cameroon on building sustainable and inclusive smallholder farming food value chains by the Community Partners for Sustainable Development showed the importance of improving linkages across the food value chain. The economic impacts of geographical indications (GI) were shown to be a useful tool for the development of sustainable food systems. An example of a study undertaken in Zambia on smallholder farmer participation in the modernization of food systems – insights from the dairy value chain – revealed that with investment and support progress can be achieved. The National Council for Sustainable Development of Honduras provided insight into their project that contributes to the improvement of the productivity and competitiveness of producers/organized rural workers through the establishment of strategic alliances with commercial technicians, both financial and private, in the framework of agri-food value chains. The World Banana Forum’s multistakeholder platform to develop practical guidance for sustainable banana value chains reiterates the need for collaboration and thus appropriate governance. The discussion noted that we are at the heart of sustainability with a mix of initiatives and perspectives, that all aim to have an impact on a geographic space, population, through food value chains, markets and consumption. The discussion

emphasized the concept that diversity of actors involved is fundamental; however it was clear that there is a need to build a common consensus through working together in order to reach concrete results.

The fifth session looked at institutions, markets and contracts for SFS along food value chains. A study undertaken by the French National Institute for Agronomic Research and FAO based on 12 studies in 12 different countries analysed what an “agro-ecological” value chain could look like. It provided insight on understanding how agro-ecologically produced crops become marketable products that are recognized by consumers for their agro-ecological qualities. There is a growing need for transition towards more sustainable food systems, which requires the promotion of innovative approaches to ensure social and economic prosperity, while preserving the environment, ecosystems and biodiversity. In 2014, FAO organized an International Symposium on Agroecology for Food Security and Nutrition; the recommendations from this symposium outlined the need to support and create market interactions that foster agro-ecological food systems. Campagna Amica-Coldiretti Italian Farmers looked at the delivered benefits in terms of economic and social aspects touching on the “short food chain” aspect. The conceptual and practical elements of short value chains were presented, with an emphasis on innovation applied in the interactions between producers and consumers, insisting on the fact that it can be brought up to scale. Taking Africa as a case study, the presentation of the African Union Commission discussed the protection of products against piracy through GI, and presented its strategy on GI for the continent with the aim of better positioning African products for export, development and exchange between stakeholders, preservation of traditional produce in local markets and value creation for farmers and along the chain. The discussion emphasized the focus on value chains and markets in association with agroecology. It was clear that when considering concrete action in the field one cannot overlook associated value chains, markets or the post-farm gate economic dimension.

The sixth session was on catering and hospitality. The presentation by the Muenster University of Applied Science looked at the changing policies and practices against a background of rising digitalization and the blurring between retail and food service channels. Smaackmakers explained the how and why of working towards new standards for catering and how this stimulates a more sustainable chain that brings value to all chain actors – for consumers, companies, caterers, suppliers, producers, and eventually to a new food culture. FAO looked at public procurement of food from local smallholder farmers and the potential to create, stimulate and support transformative development of food supply systems, as well as the challenges in designing and implanting local food procurement for school programmes. The University of Bologna presented preliminary results on a methodology to assess food waste in primary schools involving pupils. The discussion noted that catering in itself is an important lever of change, because of the volumes of products as well as the environmental, economic and social impact. It is also noted that it is one of the ways for public actors to trigger change, and also as a means of broadening the information and communication with consumers.

The seventh session was dedicated to the coordination of actors along food value chains. The Organic Food System Programme considered the organic food system as a “living laboratory” for sustainable food systems. The Ministry of Agriculture and Livestock of Costa Rica presented a voluntary certification system that is focused on the certification of agricultural products free of agrochemicals and on production processes that apply good agricultural practices concerning natural resources and inputs. Origin Green shared Ireland’s National Sustainability Programme and its experiences, the lessons relevant for other sustainability programmes and the challenges ahead. The discussion noted that the importance of the coordination of actors has already been mentioned in several of the other sessions. It acknowledged that sustainable consumption can drive sustainable production; however, each case is different. It was mentioned that there is a need to compile data and to focus on priority areas, also to better understand reasons for success and failure.

The eighth session was on communication to consumers. Standards GS1 looked at consumer communications of product level sustainability information and how technology, such as barcoding might be an effective way to capture information and communicate it to consumers. Wageningen UR introduced the work of the Sustainability Consortium, which develops a globally harmonized monitoring and reporting system for consumer products, describing the tools used and sharing experiences on implementation with large global retailers. The discussions reiterated the importance of giving the consumer the opportunity to have all the information pertaining to a product while avoiding confusion.

MAIN CONCLUSIONS

The workshop, provided very dense discussions, covering a number of topics related to sustainability along the food chain, including the different dimensions of sustainability (in particular the ones that often tend to be forgotten, such as the social dimension and biodiversity within the environmental dimension), the different links in the chain and different scales of action. It is clear that sustainable food value chains need to be integrated with the multidimensional concepts of sustainability, including employment and income generation opportunities in rural areas, particularly for women. The value creation along the chain must be a solution for compensation for the producer, and business models need to be invented to enable the change: what allows private actors and consumers to make the right choices.

There is a need for collaboration between various stakeholders and communication of information is key. Through shared learning and support, improvement in the social, economic and environmental dimensions can be achieved. The presentations and discussions also highlighted that change takes time and that policies, institutions and governance need to provide for this dimension.

Opening remarks

Ren Wang

Assistant Director-General

FAO, Agriculture and Consumer Protection Department, Rome

Dear co- chairs, dear delegates, colleagues, ladies and gentlemen,

Welcome to this workshop on “*Sustainable Value Chains for Sustainable Food Systems*”, organized by FAO within the FAO-UNEP Sustainable Food Systems Programme and supported by the Government of Switzerland, which I thank.

It is the third of its kind. It is also the first one contributing to the Sustainable Food Systems Programme of the 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP SFS Programme).

It is also the first one open through webcasting, thanks to the support of the technical network on sustainable food value chain development of FAO.

The first workshop, in 2013, was dedicated to voluntary standards for sustainable systems, with the objective to complement and valorize the workstream on voluntary standards initiated in FAO.

The second workshop, in 2014, was dedicated to knowledge for sustainable food systems. Improving knowledge collection and sharing is central to progress towards more sustainable food systems. This preliminary analysis enabled to the characterization of knowledge needs for SFS and ways to address them. It was at a very timely moment to ground some of our work towards Expo 2015 in Milan, as well as to finalize some of the elements of the Sustainable Food System Programme.

I expect this one to be as productive and useful for our future collective work.

I already note two very encouraging points:

- First, the considerable increase in proposals for presentations. We had difficulties in prioritizing them.
- Second, the diversity of interventions, topics covered and actors, with an improved balance of interventions between knowledgebased organizations, governments, the private sector and civil society. This is really in itself an accomplishment to thrive for.

This third workshop aims at better framing the notion of the “sustainable value chain”. It will examine potential contributions of the organization, functioning and governance of food value chains to the sustainability of food systems, with particular attention to environmental issues, including resource use efficiency and biodiversity, economic and social issues, including gender.

It will consider resource use efficiency (energy, water, etc.), including potential uses of coproducts and by-products, reduction of losses, etc. along food chains.

It will also consider how the very organization of food value chains can improve sustainability as well as employment and income generation opportunities in rural areas, particularly for women.

As such it aims to provide food for thought for the Multi-stakeholder Advisory Committee (MAC), occasions to discuss, exchange ideas and good practices and build partnerships.

It also contributes to the own work of FAO and to its contribution to the 10 YFP SFS programme.

The Committee on Agriculture, in 2014, at its 24th session *“has encouraged FAO to further integrate its work on the sustainability of food systems”, including the development of a programme on sustainable food systems to be integrated in the Ten-Year Framework of Programme on Sustainable Consumption and Production (10YFP-SCP)*. And I will be happy to report to COAG, in September that the programme has been approved by the Board of the 10YFP.

Sustainable food production and consumption are at the heart of FAO’s five Strategic Objectives (SOs) and of much of FAO’s technical work.

SO2 *“Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner”,*

and SO4 *“Enable more inclusive and efficient food and agricultural systems at local, national and international levels”* clearly concur to the objectives of the programme;

while having cross-cutting linkages with SO3 *“Reduce rural poverty”* as well as with SO5 *“increase the resilience of livelihoods to threats and crises”*.

All of them also contribute to SO1 *“Contribute to the eradication of hunger, food insecurity and malnutrition”*.

Through concerted efforts within its SOs, FAO can contribute significantly to the development and implementation of the 10YFP SFS Programme.

FAO will continue to provide support to such interventions that improve interactions between multiple actors, towards collective action.

This is the time to unite our forces to realize the “Future we want”.

Opening remarks

Adrian Aebi
Assistant Director-General
Federal Office for Agriculture, Switzerland

Good afternoon, ladies and gentlemen, and thank you to the organizers of this workshop from FAO and UNEP for inviting me to give this welcome address.

My name is Adrian Aebi and I am an Assistant Director-General at the Swiss Federal Office for Agriculture.

I would like to welcome you here today both in the name of my Government – that supports this workshop as a contribution to the Ten-Year Framework of Programmes on Sustainable Consumption and Production (10YFP), as well as on behalf of the co-lead organizations of the 10YFP Sustainable Food Systems Programme.

Many of you are part of the network of the 10YFP Sustainable Food Systems – or “SFS Programme”.

I would at this point like to extend a special welcome to those of you who are *partner* organizations of the SFS Programme. We are happy that you were able to join us, especially since this is the first opportunity for us to meet in person and exchange among the broader network of the Programme.

But of course we are also very pleased to welcome all those of you who are not yet formally engaged in the SFS Programme, but who are working on topics and initiatives of key relevance to the SFS Programme.

To provide you with the context for this workshop, I would thus like to say just a few words about the 10YFP Sustainable Food Systems Programme: 10YFP stands in short for the “10-Year Framework of Programmes on Sustainable Consumption and Production” of the United Nations, which was adopted at Rio+20 in 2012.

The 10YFP Sustainable Food Systems Programme is one of six global multistakeholder programmes of this ten-year framework.

The goal of the Sustainable Food Systems Programme is to accelerate the shift towards more sustainable food systems, by promoting concrete activities in the areas of: awareness raising; capacity development; making available information, knowledge and tools; and strengthening partnerships.

Switzerland, South Africa, WWF and Hivos are co-leading the Sustainable Food Systems Programme, coordinating its implementation with the support of a Multistakeholder Advisory Committee comprising 23 member organizations. In addition, the Programme currently has more than 70 partners worldwide.

Several of the persons in this room represent member organizations of our Multistakeholder Advisory Committee – or “MAC” – and we just had our third meeting yesterday and this morning.

FAO and UNEP are also members of our MAC. In fact, they have been collaborating on the topic of sustainable food systems even before our Programme existed, in the framework of the joint FAO-UNEP Programme on Sustainable Food Systems, which was also supported by Switzerland.

It was FAO and UNEP who, as part of their interagency collaboration, were leading the work for the development of the 10YFP Sustainable Food Systems Programme.

The topic of this workshop – *sustainable value chains* – is at the very heart of the 10YFP Sustainable Food Systems Programme, which is all about promoting a systems-based approach, making food systems more sustainable at all stages of the value chain, from production, processing and retailing to consumption.

In fact, “sustainable value chains” is one of the four strategic topics of the SFS Programme agreed upon yesterday at our MAC meeting. This means that the Programme will develop and implement joint initiatives to promote sustainable value chains – inclusive, collaborative projects that will allow SFS Programme partners to join forces towards their common goal.

It is therefore a great opportunity for the SFS Programme to have all this expertise concentrated in one room for one and a half days.

I invite you all to make best use of this opportunity and to do active networking and get to know each other, with a view to identifying potential for collaboration and creating new synergies.

And, of course, I invite all of you that have not yet done so to become partners of the 10YFP. Just get in touch with my colleagues Dominique Wolf or Patrick Mink for more information.

With this, I believe I have exhausted my speaking time, and I wish you all a very interesting workshop with fruitful discussions.

Thank you very much.

Case study methodology to find the causes of food loss and develop solutions

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ABSTRACT

The Global Initiative on Food Loss and Waste Reduction (SAVE FOOD) has designed a case study methodology aiming to analyse the causes of food losses and find solutions in small-scale agriculture and fisheries subsectors. In addition to post-harvest management, inputs to the methodology have been widely sought from experts in environmental, social and gender, and food safety and quality aspects inside and outside FAO. The methodology divides a case study into four modular phases: screening, survey, sampling and synthesis. Activities in each phase are described in the paper. The methodology has been tested in various food supply chains of several countries, and feedback has been sought from local researchers.

INTRODUCTION

Food loss and waste (FLW) have been increasingly drawing the attention of stakeholders from public and private sectors. Plenty of global and regional initiatives on this issue have been established. The Zero Hunger Challenge called for “zero loss or waste of food”, and the United Nations Sustainable Development Goal SDG 12.3 aims to “halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses” by 2030. At the regional level, the African Union has pledged to “halve the current levels of Post-Harvest Losses by the year 2025” in the Malabo Declaration in 2014. To significantly reduce food waste, the European Union carried out the FUSIONS (Food Use for Social Innovation by Optimising Waste Prevention Strategies) project during the last few years. The Community of Latin American and Caribbean States (CELAC) has formed a Regional Alliance for Food Loss and Waste Reduction to achieve the target of halving the amount of per capita food and loss waste by 2030.

FAO launched the Global Initiative on Food Loss and Waste Reduction (SAVE FOOD) in 2011 with the intention of coordinating worldwide efforts in FLW reduction and support field projects. Recognizing the lack of tools designed to find the causes of FLW, SAVE FOOD has developed a case study methodology for small-scale agriculture and fisheries subsectors (FAO, 2016a). This activity is in line with a recommendation from the High Level Panel of Experts on Food Security and Nutrition (HLPE) that FAO should “consider developing common protocols and methodologies to measure FLW and analyse their causes” (HLPE, 2014).

Box 1: The distinction between food loss and food waste

In the *Definitional framework of food loss* published by SAVE FOOD (FAO, 2014), “food loss” is defined as “the decrease in quantity or quality of food”. The document makes the following statement on food loss and food waste:

Food loss in the production and distribution segments of the food supply chain are mainly caused by the functioning of the food production and supply system or its institutional and legal framework.

An important part of food loss is called food waste, which refers to the removal from the food supply chain of food that is fit for consumption, or that has spoiled or expired, mainly caused by economic behaviour, poor stock management or neglect.

Food waste is not sharply defined. However, it is still recognized as a distinct part of food loss, because the underlying reasons, economic framework and motivation of the food supply chain actors for wasting food are very different from the unintended food loss, and subsequently the strategies on how to reduce food waste are conceived in a different, targeted manner. Although the term “food loss” encompasses “food waste”, the term “food loss and waste” will continue to be used to emphasize the importance and uniqueness of the waste part of food loss.

The case study methodology is designed for unintended food loss, which is the dominant form of all food losses in developing countries. In this paper, “food loss” denotes unintended food loss.

BACKGROUND

It is estimated that about one-third of the food produced in the world for human consumption every year – approximately 1.3 billion tonnes – ends up lost or wasted (FAO, 2011). Even if just one-fourth of such an amount could be saved, it would be enough to feed 870 million people. Considering that the global undernourished population was about 793 million in 2015 (FAO, 2016b), FLW reduction is an effective solution to hunger.

FLW takes different forms in industrialized and developing countries, as do the causes. In developing countries, FLW mainly occurs at the early stages of food value chains (harvesting, handling, storage, processing, etc.) and can often be attributed to financial, managerial and technical limitations. Typical causes include outdated harvesting techniques, insufficient storage facilities, poor infrastructure and underdeveloped financial and market systems. In industrialized countries, however, food is mostly lost and wasted in the retail and consumption stages because of behavioural reasons (e.g. consumers’ preference) and unbalanced market supply and demand. The strong contrast indicates that different approaches to the FLW problem need to be developed for industrialized and developing countries.

SAVE FOOD prioritizes supporting food loss reduction in developing countries. Food loss assessment studies conducted in developing countries have so far heavily focused on collecting national and regional statistics, which are undoubtedly important but nonetheless provide very little information on how exactly food loss happens, and therefore cannot be relied on for developing effective solutions. The case study methodology is intended

Box 2: Some notable efforts on food loss quantification and assessment

Global Strategy to Improve Agricultural and Rural Statistics (GSARS)

GSARS is the largest global effort ever put forth to enhance and ensure the sustainability of agricultural and rural statistics in developing countries. Its goal is to improve these countries' statistical capacities for producing agricultural and rural statistics and using them to design more effective food security and agricultural and rural development policies.

African Postharvest Losses Information System (APHLIS)

APHLIS is a network of African cereal grain experts, backed up by a database and a post-harvest loss calculator that together facilitate the estimation of annual post-harvest losses for the cereal grains of 38 countries in sub-Saharan Africa. The underlying scientific data used to estimate losses can be accessed in a fully transparent manner.

APHLIS is currently being updated and expanded under a new project named APHLIS+. More crop varieties will be covered and the accuracy of estimation models will be improved.

Global Food Loss Index (GFLI)

The GFLI, being developed by the Statistics Division of FAO, aims to measure national trends in food losses along production and supply chains. It has been established as an indicator for measuring success in achieving the Sustainable Development Goal of food loss reduction. The GFLI first imputes the estimates of post-harvest/post-slaughter losses of food commodities, and then calculates an index to aggregate the volumes of losses for each country for each year. These estimates can then be aggregated at a regional or even global level.

Food Loss and Waste Protocol

The FLW Protocol is a multistakeholder effort for guidance on practical and consistent FLW quantification. Coordinated by the World Resources Institute (WRI), FLW Protocol has developed a global accounting and reporting standard for quantifying FLW, known as the *FLW Standard*, which was launched in 2016.

The *FLW Standard* was designed to harmonize and standardize how quantitative FLW data are accounted for and reported by providing a set of accounting and reporting requirements and universally applicable definitions. It contains information on all aspects of the quantification process, including preparing to quantify, important concepts and definitions, and guidance on methods. An appendix covering conversion, quantifying donations and data management is also included.

Rapid Appraisal Tool for Food Losses

This tool was developed by the German Federal Enterprise for International Cooperation (GIZ). It is a methodology for rapid value chain assessment and does not intend to provide sufficient data for evidence-based policy or enterprise decision-making. It is able, however, to help identify loss hotspots within value chains, and to propose fields of action to reduce the loss. It is supposed to be a first step towards an integration of loss-reducing activities in existing value chains. The application of the tool has to be followed by in-depth analyses, such as loss quantification, cost-benefit analyses, etc.

to fill this gap by focusing on identifying the symptoms and causes of food loss and finding relevant solutions. Another goal of developing the methodology is to promote a uniform approach in collecting first-hand (i.e. by direct observation, direct interaction with chain actors and direct measurement) information on food loss, so that the results are comparable. It should be noted that the methodology is only applicable to one or two selected food supply chains (FSCs), not national subsector studies. SAVE FOOD hopes to conduct as many case studies as possible covering different geographical areas in a country, so that the results are representative and could be extrapolated.

FLW is a widely crossing-cutting issue. Therefore, the methodology has been developed in extensive and constant consultation with related FAO divisions such as agro-industries, fisheries, nutrition, animal production, statistics, social protection, environment and food safety.

DESCRIPTION OF THE METHODOLOGY

The core of the methodology can be summarized as an approach consisting of “4S” phases: *screening*, *survey*, *sampling* and *synthesis*. Figure 1 shows the links among them and the overall procedure of a case study.

The arrows in Figure 1 show supporting relationships among the phases. Screening collects readily available information on the FSC and provides initial inputs and guidance for field activities, which utilize survey and sampling to gain a deeper insight into the food loss situation. Screening, survey and sampling all feed information for the synthesis phase, where causes of food loss are identified and solutions are proposed. At the end of the study, observations and findings need to be presented in a detailed report and validated with related stakeholders. The methodology has a modular design, i.e. not all the phases need to be carried out for a successful case study. The researchers can select which phases to include in the study plan based on study purposes, target audience and available resources, but it is strongly recommended that first-hand information be collected as much as possible.

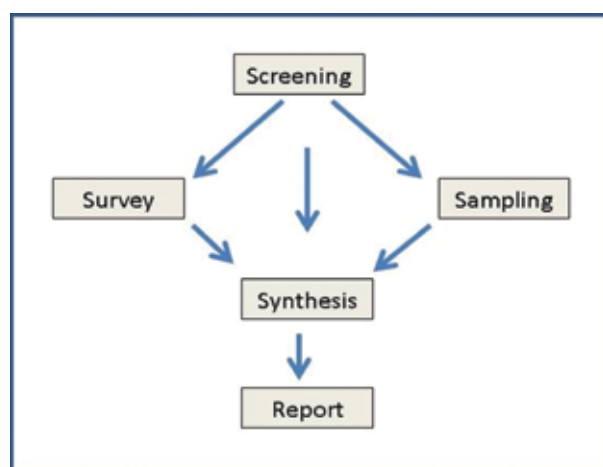


Figure 1. Phases of the case study methodology

Source: Adapted from FAO (2016a).

The food loss situation of an agricultural subsector is a prerequisite to field action plans for loss assessment, so a preliminary **screening** needs to be performed after a subsector is selected. In this phase, researchers collect secondary data using existing documentation and key informant interviews to gain general knowledge of the subsector, without travelling to the field. The process should involve a wide range of data sources (e.g. government ministries, research institutions, libraries, NGOs, the private sector, etc.) and experts from

all relevant disciplines (e.g. environment and climate change, sociology, natural resources, food technology, food safety, economy, etc.). After screening, the researchers should form a general understanding of the food loss situation and the importance of the various FSCs in the subsector, based on which specific FSCs can be selected for in-depth investigation.

From the standpoint of SAVE FOOD, it is preferred to select FSCs that:

- are based on smallholder producers;
- have a significant scale in food production;
- include agroprocessing and urban markets; and
- are included in an ongoing support programme for the subsector, if possible.

Based on the groundwork laid by screening, field activities will be conducted, using **survey** and **sampling** methods. The purpose of these two phases is to collect first-hand information on quantitative and qualitative food loss. (The *Definitional framework of food loss* has defined clearly quantitative and qualitative food loss.)

The survey method consists of two components: interviewing FSC actors and making observations of the FSC. The interview process should include all major groups of chain actors (e.g. producers, processors, distributors, wholesalers, retailers, etc.) and informants knowledgeable about the FSC. As the field study aims at not only obtaining the statistics of losses but also grasping the real situation of the FSC, it is strongly recommended that semi-structured interviews be used because researchers have more flexibility in adapting the questions to the context. The researchers should be clear on the goals and capable of designing and conducting semi-structured interviews.

Equally important is the observation part, for there may be information that is not captured in the interviews but is closely related to the losses in the FSC. Such information could be related to a wide range of aspects such as cultural norms, social structure, politics, international business environment and others. It is thus important for researchers to keep detailed field notes. When possible and permitted, interviews can be recorded and photos and videos can be taken of the FSC.

An on-site validation meeting needs to be held at the end of this phase to communicate the findings obtained from the survey to key representatives of the community, including governmental staff. Awareness on food loss can be raised in this way and it is an opportunity to discuss further steps, such as loss reduction interventions.

Although the case study methodology is mainly meant to find the causes of food loss, actual measurement of loss is strongly encouraged, because first-hand quantitative data on food loss in developing countries are severely lacking and in critical need. The load tracking (LT) method is highly useful for measuring loss along a specific FSC in the sampling phase. The process of LT, in brief, is to evaluate the quality and/or weight of a “load” of food product before and after one or more events in the FSC. The difference between the data before and after the events is considered as loss, except for weight losses resulted from regular intentional processes such as drying, fermentation, heating, etc. The events can be one or more stages of the FSC, such as post-harvest handling, storage, processing, transportation and marketing; they can also be tailored to specific purposes, such as a step in processing or a certain period of time in storage. A “load” is a certain quantity of food product, which can be tracked through the selected events in the FSC as one batch, and of which the changes in quality and/or weight can be measured.

Box 3: Common sampling schemes in load tracking

Simple random sampling

Each object in the population has the same probability to be selected into the sample. Whether or not one object is chosen is entirely determined by chance.

Example Ten apples are randomly selected from a basket of 100 apples to be tested for pesticides.

Stratified sampling

The population is first divided into groups (called “strata”) based on certain rules, and then objects in the groups are randomly chosen. This approach is used when the objects in the population possess distinct traits.

Example In a warehouse that stores 5 000 bags of rice, 70 percent of the stock is variety A and the rest, 30 percent, is variety B. To obtain a representative sample of 50 bags, 35 bags (70 percent of 50) of variety A and 15 bags (30 percent of 50) of variety B are randomly selected.

Multistage sampling

When the population size is very large, it may be difficult to conduct simple random sampling. If the population can be organized in multiple layers, the layers can be sampled first, and then the objects in the sampled layers are sampled.

Example A study needs a sample of farming households in a province. The researchers first list all the subprovincial administrative areas, and conduct a random sampling to obtain a sample of these areas. In each of the sampled areas, a certain number of farming households are sampled.

Depending on the size of the load and available technical resources, a smaller sample may or may not need to be taken from the load for measurement. If statistical representability is desired, a sampling scheme needs to be devised and deployed. Typical sampling schemes in LT include simple random sampling, stratified sampling and multistage sampling.

As one LT exercise can only reflect the situation at the time and place of study, to better cover the performance of the FSC in different seasons and geographical areas, and under different human practices, several LT exercises should be conducted in various carefully chosen combinations of such conditions.

LT can be used to collect reliable quantitative food loss data, but it is costly to implement and requires meticulous time planning and great competence. LT hence may not be included in every field case study. It is, nonetheless, strongly recommended that LT be conducted whenever and wherever conditions allow. It would be meaningful even for one small step of the chain.

An essential task in the screening, survey and sampling phases is to identify potential critical loss points (CLPs), which are defined as the points in the FSC where food losses have high magnitude, great impact on food security and a potent effect on the economic results of the FSC. Researchers should be able to capture potential CLPs in literature reviews and expert interviews during screening. These CLPs are subject to validation in the survey and sampling phases, which can also be used to discover CLPs.

Box 4: A brief explanation on the symptoms and causes of food loss

Symptoms and causes

In the feedback received from field researchers, the difference between the two concepts has often been mentioned as a source of confusion.

Usually, symptoms of food losses can be perceived by eye, nose, taste or touch. For example, puncture, bruise, rot, discolouring, mould and wilt can affect fresh produce. Milk may become sour. A strong odour indicates bad fish.

To develop effective measures against food loss, it is crucial to pinpoint the real causes, which may sometimes be challenging. Moulding is, apparently, caused by fungi, but why have the fungi grown in the first place? The answer may be failure to control moisture in handling and storage or, deeper down, the lack of funding to implement suitable technology or difficulty with energy access. Fruit bruises may be caused by improper handling practice, but the underlying reason may be the scarcity of suitable packaging materials.

Meanwhile, there may be some points in the FSC where the losses are unexpectedly low, which are called low loss points (LLPs). It is very important to record such observations and find the reasons why the losses are low, as the LLPs may be the result of good practices and/or conditions that could serve as solutions to high losses.

The **synthesis** phase directly touches upon the fundamental purpose of the methodology: finding solutions to food loss. The real causes of food loss can sometimes be obvious, but more often obscure. Because of the complexity of FSCs, the symptoms and causes of food losses may not exist in the same step of the chain. Inappropriate harvesting and storage practices result in invisible qualitative reduction in raw materials for processing, and the final product of processing thus becomes unsafe for human consumption and ends up being lost. Unpredictable, sudden financial crisis bankrupts an overseas purchaser, so the crop harvest produced for it cannot be sold and is eventually ploughed back into soil. Therefore, the cause-finding process needs to follow a holistic approach based on comprehensive and accurate knowledge of the FSC, which should be obtained during the screening, survey and sampling phases. Possible causes need to be examined at micro (each stage of the FSC), meso (structural/secondary causes) and macro (national policy, law and regulation) levels. Sufficient consultation and validation from different sources and informants need to be ensured. After the causes are identified, solutions to food loss can be drafted correspondingly.

The assessment of the implications of solutions, which is frequently overlooked, is also included in the synthesis phase. In addition to feasibility analyses on technical and economic aspects, an evaluation report of the environmental and social implications of the solutions also needs to be prepared. The solutions should concord with the following principles:

- not be more expensive than the food loss itself;
- not place a higher burden on the environment and greenhouse gas (GHG) emissions;
- make more food available to the people that need it most;

- be socially and culturally acceptable;
- have no implications on consumers' health (e.g. an unsafe food product should be discarded).

A national stakeholder workshop needs to be organized at the end of the study to discuss and validate the proposed solutions and define the elements of a food loss reduction strategy.

IMPORTANT ASPECTS TO CONSIDER IN FOOD LOSS REDUCTION

Food loss is a multifaceted phenomenon. Its causes and impacts are not necessarily limited to ordinary aspects in value chain development such as technology and markets. Some other aspects must be taken into account when conducting field case studies and developing solutions.

It is important to understand the impacts of food loss and its solutions from an environmental and climate change perspective. Food production systems rely on a limited natural resource base along with the goods and services provided by natural ecosystems. Food loss is a waste of resources and inputs and contributes to the degradation of terrestrial and aquatic ecosystems. Reducing food loss will therefore help improve the efficiency and sustainability of FSCs while reducing GHG emissions embedded in the losses simultaneously. Furthermore, reducing food loss is key to increase the adaptive capacity to climate change.

The role of energy must also be considered when assessing the causes of and solutions to food loss. Insufficient access to modern energy and related technologies may have a significant influence on post-harvest losses. It is therefore important to identify the different technologies and sources of energy utilized along the FSC in order to weigh the climate-smart technology options for food loss reduction.

Gender analysis of the FSC provides an understanding of the underlying causes of food loss from another important aspect. The different productive and social roles of men and women may lead to imbalanced power relationships, thus affecting their access to resources, technologies and services. This inequality decreases the efficiency of the FSC, often resulting in more food loss.

Assuring food safety and quality is an indispensable element of food loss reduction. Food safety is the most critical dimension of food quality. If the quality has deteriorated to a level that the food is no longer safe for human health, the food needs to be removed from the FSC, resulting in quantitative food loss. This is sometimes due to the lack of compliance with food safety regulations and standards. The effectiveness of food safety control can vary from one geographical area to another and also depends on the selected value chain, infrastructure and national capacity, none of which should be overlooked when identifying the causes for food loss.

To emphasize the importance of a multidisciplinary solution-finding approach, the environmental, social and food safety aspects of food loss have been deeply integrated into the methodology. It would be ideal that the research team contains such expertise, and that the experts of these disciplines participate in the field trips to make observations. Stakeholders involved in each discipline, especially governmental agencies, need to be included in validation workshops. The methodology recommends that the following

information on the selected FSCs be collected and reported:

- Environment and climate change
 - o How food production interacts with the environment, supporting ecosystems and climate change
 - o Farmers' capacities in climate change adaption
 - o National policy framework of climate change adaptation and the position of FLW reduction in it
 - o Energy access and use in the FSC
- Social and gender
 - o Different genders' levels of access to resources and services
 - o Cultural practices in the FSC
 - o Social positions of different genders in the FSC
 - o Female inclusion in the studies
- Food safety
 - o National food safety regulation including enforcement and control mechanisms
 - o Food safety and quality management systems and standards, both voluntary and regulatory
 - o Common food safety practices and hazards in the FSC
 - o The capacity of chain actors and regulatory agencies in applying food safety and quality management requirements

FEEDBACK

The methodology has been used in many studies that SAVE FOOD is involved in, as listed in Table 1. Currently, all the countries are in Africa and Asia. SAVE FOOD looks forward to expanding similar activities to more regions and FSCs.

Feedback on the methodology and how it should be implemented has been continuously sought from local researchers. FAO held two large workshops in Zimbabwe and Cameroon in 2016 to provide an opportunity to exchange experiences among various stakeholders from African countries and to discuss the challenges in developing and implementing the methodology. Major feedback received is listed as follows.

- The training of researchers and consultants on the methodology needs to be reinforced before the fieldwork starts. Agricultural extension staff should also receive similar training as they can provide support during the studies. Researchers who are experienced in using the methodology are a good choice to conduct the training.
- To obtain high-quality information in screening, it is better to interview the key informants face-to-face than by phone or e-mail, where needed.
- The importance of using semi-structured interviews needs to be stressed. The interviews should be administered by the researchers in person. Rigid statistical questionnaires should be avoided.
- Farmers generally lack awareness on the extent of loss and its negative implications on their livelihood and income. The capability to record food loss data accurately and systematically is mostly missing. Awareness raising and capacity building in these aspects are highly necessary.

Table 1: Countries where field case studies have been or are being conducted following SAVE FOOD's case study methodology and corresponding food supply chains

Country	Food Supply Chain
Angola	maize, cassava
Botswana	maize, cowpea
Burkina Faso	maize, sorghum, cowpea
Cameroon	tomato, potato, cassava
Cote d'Ivoire	maize, cassava, mango, plantain, tomato
Democratic Republic of the Congo	maize, rice
East Timor	maize, rice
Egypt	tomato, grape
Ethiopia	maize, teff
India	rice, chickpea, mango, milk
Indonesia	fish
Kenya	banana, maize, milk, fish
Lebanon	apple
Malawi	maize, groundnut
Morocco	wheat, date, citrus, fig, prickly pear, apple
Namibia	maize, millet
Rwanda	maize, potato, milk, tomato
Swaziland	maize, horticulture
Tunisia	dairy, cereals
Uganda	beans, maize, sunflower
Zambia	maize
Zimbabwe	maize, horticulture

- FSC activities may be highly seasonal and happen months apart in some long chains, so for researchers to actually observe the activities being performed, fieldwork needs to be carefully planned beforehand. This requires good coordination among donors, FAO, researchers and local stakeholders.
- LT is challenging to perform. It requires the researchers to be present in the field at the right moment. How to conduct LT also needs to be better explained to the researchers.
- To compensate for seasonal variations, the case study should be repeated in three consecutive seasons. Corresponding tools and approaches for periodic evaluation need to be developed.
- Some key terms in the methodology, such as CLP, LLP and qualitative loss, need to be more clearly explained.
- More training should be provided on how to identify the causes of food loss.
- The environmental and gender dimensions of FLW are new concepts to many. Awareness of them and capacity for assessing them are lacking.
- In some countries, basic equipment for assessing food loss, e.g. moisture meters and mycotoxin testing kits, is scarce. While funding for purchasing and deploying the essential apparatus should be sought, sometimes indigenous knowledge on food loss monitoring needs to be relied on.

- Visual scales are very useful for evaluating qualitative loss, which is a challenging task. Developing such tools for all major crops studied would be very useful in assessing the level of quality diminution or loss and the related decrease in market value.

CONCLUSION

The case study methodology has been developed to find the causes of food loss and to help form appropriate solutions. The novel, multidisciplinary approach adopted in the methodology addresses many important aspects of food loss that have not received enough attention. The results of several case study projects have already been helping country governments to formulate national strategies on food loss reduction.

This methodology is a work in progress and will be improved based on the experiences gained through application to best fit countries' needs and resources. SAVE FOOD will address the issues mentioned in the feedback and try to provide more support to local researchers. An e-learning course aiming at familiarizing field researchers with the methodology and assisting them in using it is being developed by FAO. Some modules will be ready soon.

Meanwhile, SAVE FOOD will continue seeking resources to conduct more field case studies using the methodology. Data accumulation is a costly, long-term process, so other organizations are strongly encouraged to use the methodology to initiate more case study projects. Particularly, because the methodology is not intended as a quantification tool, food loss measurement exercises could be complementary to reveal the full extent of food loss in a given context.

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Food loss and waste across the milk value chain in Pakistan

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ABSTRACT

This paper describes the results of a study on food loss and waste (FLW) in the milk value chain in Pakistan using the methodology from a recent protocol developed by the United Nations Environment Programme (UNEP) and the World Resources Institute (WRI). Data were collected and analysed by Deloitte Sustainability. The scope of the study encompassed losses at the farm level for Nestlé's supply chain in Pakistan (ranging from small to large farms) and included collection, processing and distribution right through to waste by the final consumer. The total FLW were found to be only 1.3 percent, which is significantly lower than other published figures. The main approaches that have led to these low numbers are discussed as well as new opportunities identified during the study to increase milk productivity.

INTRODUCTION

A report issued by the Food and Agriculture Organization of the United Nations (FAO) in 2011 estimated that approximately one-third (by weight) of the global food production is lost or wasted every year (FAO, 2011). However, until recently, no consistent methodology was available to quantify food waste using standard definitions and criteria, which made comparisons challenging and increased the difficulty to make measurable change.

To address these challenges, the United Nations Environment Programme (UNEP)/World Resources Institute (WRI) Global Food Loss & Waste (FLW) Protocol (WRI, 2015) was launched in October 2013 in order to develop a global "FLW Standard" to account and report on food waste across the food chain. Nestlé actively contributed to the development of the Protocol and conducted, with the support of Deloitte Sustainability, a pilot project on food loss and waste (FLW) in the dairy supply chain in Pakistan.

Nestlé started its operations in Pakistan in 1988 under a joint venture with Milk Pak Ltd and took over management in 1992. Milk has remained an important part of the business and the major part of this concerns milk fortified with iron and Vitamin C.

Milk is collected from approximately 180 000 farmers of which ~90 percent are in rural areas.. Farmers are supported through Nestlé's Farmer Connect programme of milk districts, which started in Switzerland in the 1870s and now extends to 30 countries including Pakistan. Technical, animal husbandry and veterinary support are provided as well as transportation and infrastructure thus assuring a secure route to market with storage and cooling facilities. Worldwide Nestlé has over 10 000 sourcing and supply chain staff working on the ground in the dairy field.

In Pakistan, 82 percent of the direct milk supplies come from smallholder farmers and only 18 percent from large or mega farms. There are 900 Nestlé village milk collection centres and over 3 000 Nestlé chilling centres delivering to the two Nestlé factories in Pakistan in Sheikhpura and Khanewal.

Downstream, the traditional trade (small neighbourhood shops and street vendors), accounts for 90 percent of the sales in some 270 000 outlets. Only 10 percent is sold in the modern trade of super- and hypermarkets or cash and carry.

Through the Farmer Connect programme, Nestlé was aware that milk losses in its supply chain were significantly lower than the average in Pakistan. The quantity of waste in Nestlé's supply chain had steadily decreased over the past years but the exact figures were unknown.

SCOPE AND OBJECTIVES

The scope of the study covered the entire value chain from production at the farm through to consumption (Figure 1).

The objectives of the study were to:

- quantify the losses in Nestlé's dairy supply chain in Pakistan and identify where those losses occur;
- identify areas of improvement to reduce wastage;
- provide feedback on key methodological choices related to food loss and waste quantification.

METHODS AND RESULTS

Data were collected by Deloitte through bibliographic research using official sources, phone interviews with the Nestlé Dairy Procurement and Sales Teams and a one-week field trip in Pakistan. This included estimations of milk waste by consumers through focus groups.

Waste at the consumer level was extremely low, partly due to the quite high cost of milk for consumers and partly due to upbringing and education about the value of milk and dairy products and that they should not be wasted. The results of the analysis are presented in Figures 2 and 3.

The milk that can be considered as waste in the strict sense of the Protocol represents only approximately 1.3 percent of the amount purchased annually. A further 2.3 percent (that includes milk wasted during processing) is valorized through, for example, animal feed and as such is not considered as waste. For these quantities, it is extremely important to identify the final destination to determine whether it should be considered as waste or not.

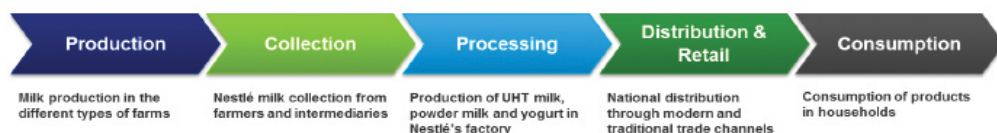


Figure 1. Dairy value chain

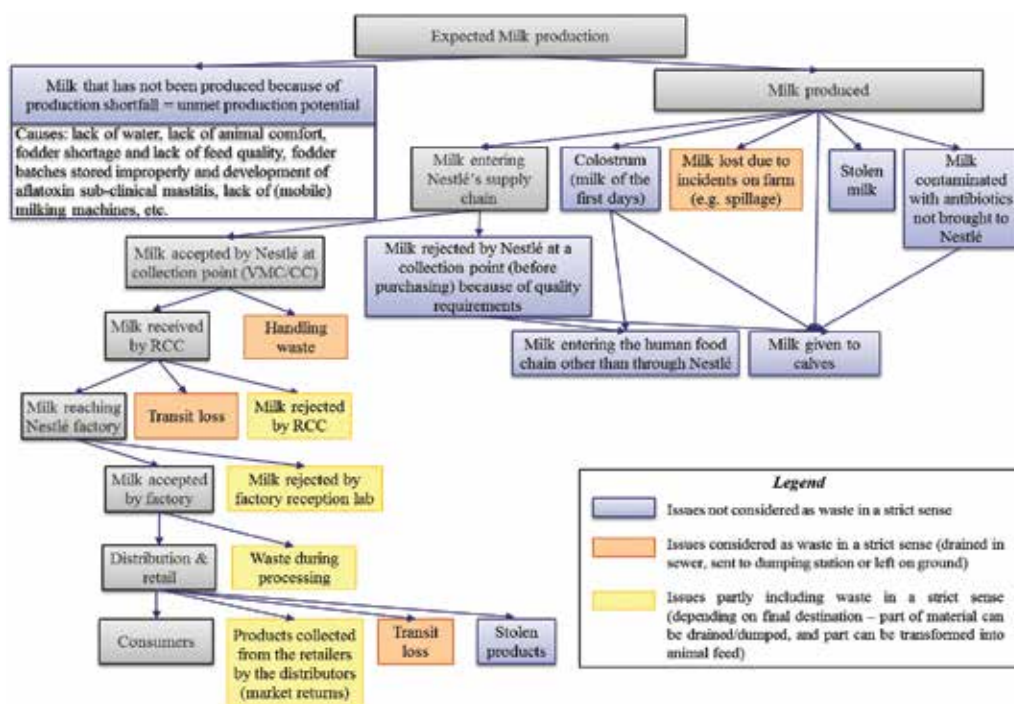


Figure 2. Issues affecting the dairy value chain influencing milk losses and waste

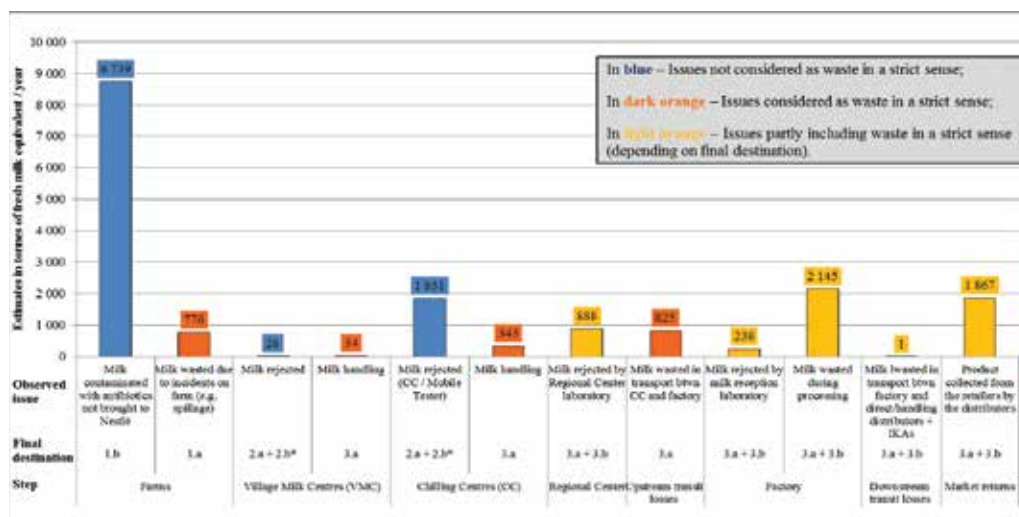


Figure 3. Estimates for observed issues at key points of Nestlé's dairy supply chain in Pakistan (volumes in tonnes per year of fresh milk equivalent)

However, significant quantities of milk are rejected by Nestlé as they do not meet our quality standards, most frequently because of contamination by antibiotics. This does not constitute waste as it is purchased and consumed via other channels, but is clearly a significant health issue. One of the actions resulting from this study is to substantially strengthen the farmers training in good hygiene practices and correct use of antibiotics. A further opportunity is to increase the access of the cows to drinking water, which would increase milk yield. Although this issue is well known, lack of water sources in the proximity of the farm can represent a significant barrier to implementation.

CONCLUSIONS

The study showed that losses of milk in Nestlé's dairy supply chain in Pakistan are extremely low due to years of training smallholder farmers in good agronomic practices and the installation of collection and chilling centres. Overall, we can conclude that the very low levels of waste overall do not offer any real opportunities for improvement.

During the investigation, potential routes to increase productivity were identified as well as the need to reinforce training in the proper use of antibiotics to decrease milk rejection rates, especially as this feeds into non-Nestlé supply chains and is still consumed.

Specific feedback on the protocol from the experience gained in this pilot was fed back to WRI-UNEP. The FLW Accounting and Reporting Standard was officially released in June 2016 (WRI, 2016).

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Towards zero waste and sustainable food production using human-inedible agroproducts and food loss and waste as animal feed

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ABSTRACT

Feed production is highly resource-demanding. Most developing countries have extreme shortages of feed resources. Additional feed required to satisfy the projected increased demand of animal products, if met through food grains, risk further exacerbate food insecurity in many countries. Livestock consume about 60 percent of the biomass used for food production. Most of the dry matter consumed by livestock is composed of grass (39 percent) and other human-inedible materials such as crop residues (26 percent) and agricultural by-products (bran, oilseed cakes, etc., 8 percent). Technologies are available that enhance digestibility of crop residues and by-products and also increase nutrient availability from them to animals, i.e. increase feed conversion efficiency. Increase in feed conversion efficiency enhances overall resource use efficiency. This paper will consider such technologies and illustrate “win-win” solutions: increase livestock productivity and income of farmers, decrease environmental pollution and improve social outcomes. Furthermore, approximately 1.3 Gtonnes of food are lost or wasted globally every year. A part of these losses can be converted to animal feed, through technologies such as ensiling, block making and raising insects, without compromising animal product safety and animal and human welfare. Novel human-inedible resources such as insect meals, leaf meals, protein isolates from agro-industrial by-products, single cell protein produced using waste streams, algae, co-products of the biofuel industry, etc. have potential to reduce grain use by the feed industry, further decreasing food-feed competition, and making the livestock sector more sustainable.

INTRODUCTION

The feed is the main driver of livestock production. It accounts for up to 70 percent of the total cost of livestock operation. Poor or unbalanced feeding adversely affects the productivity, health, behaviour and welfare of animals (Makkar, 2016a). In addition, this also diverts a substantial portion of feed carbon and nitrogen to wasteful products in the form of greenhouse gases (GHG). Globally, the production, processing and transport of feed account for 45 percent of the GHG emissions from the livestock sector. Enteric

methane contribution is 39 percent (FAO, 2013), which also depends on the type of feed fed to livestock. The area dedicated to feed-crop production represents 33 percent of total arable land and the grazing land constitutes 30 percent of the terrestrial land. Livestock use 8 percent of global human water use. Over 90 percent of the water use in the livestock sector is for irrigation of feed crops (FAO, 2009). Feed production, therefore, is highly resource demanding. Approximately 33 percent and 6 percent of the grains produced are used for livestock feeding and bioethanol production respectively (FAO, 2012a). The food-feed-fuel competition is one of the complex challenges, and so are the ongoing climate change, land degradation and water shortages that need addressing for sustainable intensification of livestock production and for realization of sustainable food production and consumption systems. By 2050 the world population is expected to be 9.6 billion, which will demand 60–70 percent more meat and milk than consumed today. Most of this increase will be from developing countries, which already face many food security challenges (Makkar, 2016b). Most developing countries have extreme shortages of feed resources. Additional feed required for the projected increased demand of animal products, if met through food grains, will further exacerbate the food insecurity in these countries. Livestock use about 60 percent of the biomass used for food production. Ruminant livestock consume 78 percent of this biomass used and convert crop residues and by-products into edible products. Furthermore, in marginal areas, where agro-ecological conditions and weak infrastructures do not offer much alternative, it is the main source of livelihoods and food. Most of the dry matter consumed by livestock is composed of grass (39 percent) and other non-humanly edible materials such as crop residues (26 percent) and agricultural by-products (bran, oilseed cakes, etc., 8 percent) (GLEAM, 2016). Technologies are available that enhance digestibility of crop residues and by-products and also increase nutrient availability from them to animals, i.e. increase feed conversion efficiency. Given that in the livestock production chain, feed is by far the dominating physical flow in mass and energy terms, increase in feed conversion efficiency enhances overall resource use efficiency. This paper presents feed and feeding related technologies and illustrates “win-win” solutions: increased livestock productivity and income of farmers, decreased environmental pollution and improved social outcomes including empowerment of women and decrease in food-feed competition. Constraints that limit mass application of such approaches and possible ways to overcome them are also presented.

TECHNOLOGIES FOR ENHANCING EFFICIENCY OF HUMAN-INEDIBLE FEED COMPONENTS IN RUMINANT PRODUCTION SYSTEMS

Technologies dealt with here are those that directly enhance availability of nutrients from human-inedible components and/or increase nutrient supply from them by optimizing the rumen function through supplementation of nutrients deficient in such components.

Densified straw-based total mixed rations. Crop residues such as straws and stovers are valued feed resources in developing countries where they form 50–60 percent of the ruminant diets. Efficient technologies are now available for the collection of straws from the crop fields. The collected straws can be used to form total mixed rations (TMR) by mixing with, for example, locally available oil seed cakes, urea, molasses, vitamin and mineral

mixtures, followed by compacting to form blocks or pellets using a hydraulic press. The TMR based on densified straw-based blocks or pellets supply balanced feed to animals and increase their productivity, resulting in a profitability increase for farmers (FAO, 2012b). These blocks or pellets containing no human-edible components can support a cow giving up to 15 litres of milk per day. Farmers find this technology attractive because use of a complete ration in the form of blocks/pellets decreases the feeding time. This is of particular importance for women because they are the main caretakers of animals in developing countries. Time saved in feeding empowers women because they can use this time for other productive purposes. This technology can also be effective in disaster management and emergency situations, for example floods, droughts and human-induced conflicts. Feed banks could be set up to overcome the problem of feeding animals during such natural calamities, which are common in the tropics. These blocks are easier and safer to transport and store – being denser than the original bulky straw. Also this technology provides an opportunity for the feed manufacturers and entrepreneurs to remove regional disparities in feed availability and to make available balanced feeds to dairy and other livestock farmers on a large scale. In addition to providing a balanced diet in terms of chemical composition, physical factors such as the particle size of the fibre or feeding of ingredients as individual components or as TMR also influence the nutrient use efficiency of the animal. Feeding of TMR has been shown to have several advantages over feeding ingredients separately, such as lower feed loss, higher nutrient availability, lower enteric methane production and higher animal performance (FAO, 2012b).

Chopping. Simple technologies, such as chopping forages, increase animal productivity and reduce forage waste. Both intake and rumen digestion of chopped forages are higher than the unchopped forages (FAO, 2011). Animals use a considerable amount of energy in chewing forages and chaffing saves this energy and diverts it for productive purposes. Continuous mixing of rumen contents improves the intimacy between ingested feed particles and the microbial population, which is essential for optimal fibre digestion.

Urea molasses multivitamin blocks. The crop residues are deficient in nitrogen, energy and minerals. Urea molasses block supplementation enhances the supply of nitrogen, minerals and vitamins to rumen microbes. This increases the nutrient supply to the ruminants from fibrous feedstuff, thus enhancing its efficiency of utilization. Further, feeding crop residues with urea molasses blocks can result in an increased cost: benefit ratio ranging from 1:2 to 1:5 depending on the cost of feed and sale price of milk (FAO, 2007). The blocks also provide supplements to animals in ranches. These supplements play an important role in meeting nutrient deficiencies during the dry season when the quality of the forage in rangelands decreases. In extensive grazing situations, the blocks are generally kept near watering points. Use of the blocks for both confined and grazing situations in the tropics, especially during the dry season, has been shown to increase profitability (FAO, 2007). In recent years, use of urea molasses or multivitamin blocks during a prolonged winter period or severe drought has also gained much attention. These blocks could also be used as a carrier for anthelmintic and tannin-neutralizing agents such as polyethylene glycol, resulting in higher animal productivity (FAO, 2007).

Urea-ammoniation or CaO treatment of straw. Treatment of straws with 4–5 percent urea at 50–60 percent moisture level, followed by anaerobic fermentation for 15–20 days

(depending on ambient temperature) increases digestibility by 10–15 percent units. This leads to higher animal productivity (FAO, 2011). Instead of urea, calcium oxide treatment can also be used to treat straws and stovers. Feedlot research carried out at Iowa State University showed USD28.04 higher profit per steer when fed corn stover-based diet treated with $\text{Ca}(\text{OH})_2$. The performance of the steer was similar but the treatment of stover enabled to use less corn. This strategy has been effective in replacing a substantial portion of grain in cattle diets, thus reducing the food-feed competition. It also enhanced the profit compared with the untreated corn-based ration (Russell *et al.*, 2011). Similarly, in another experiment by Shreck *et al.* (2012), crop residues (corn stover, corn cobs and wheat straw) were treated with 5 percent calcium oxide. Compared with the control finishing diet, the treatment groups were given 10 percent more roughage and less corn; however, they gained as effectively as the control animals. Economic analysis revealed USD6.46, USD21.42 and USD36.30 average profit per head from the treated diets as compared with the control when the price of the corn was USD3.0, USD4.50 and USD6.00, respectively.

Valorizing food loss and waste as feed. Silage making, especially using locally available resources as done in Bangladesh (FAO, 2011), is also an attractive approach for reducing wastage of forages, which have high availability in rainy seasons. In some months of the year, availability of vegetable and fruit wastes is also high, which can be converted into valuable resources through silage making. An FAO document, targeting extension workers, covers conversion of vegetable and fruit wastes into animal feeds in the form of silage or blocks (Wadhwa, Bakshi and Makkar, 2013). These resources can be used for feeding during the dry season when availability of feed is low.

Approximately 1.3 Gtonnes of food are lost or wasted globally every year, which is estimated to have enormous environmental, social and economic costs. Also the food loss and waste has an impact on food security, natural resource availability, and local and national economies. A part of these losses can be converted to animal feed, without compromising animal product safety and animal and human welfare. This conversion, through technologies such as ensiling, block making and raising insects, is possible. This would also decrease food-feed-fuel competition and enlarge the feed resource base, contributing to feed and food security. Valuable nutrients in food wastes can be brought back to the food chain through their use as animal feed (Wadhwa, Bakshi and Makkar, 2015a; Bakshi, Wadhwa and Makkar, 2016). Recently, a study conducted by the Bangladesh Livestock Research Institute, jointly with FAO, explored the possibility of using vegetable waste from wholesale vegetable markets in Bangladesh. These wastes had 14–15 percent crude protein and 85 percent dry matter digestibility, suggesting it to be a good feed for ruminant livestock. The levels of various hazards such as pesticides, heavy metals and aflatoxin were below the permissible levels (Huque *et al.*, 2016). A number of value added products can also be produced from fruit and vegetable wastes (Wadhwa Bakshi and Makkar, 2015b).

Spineless cactus. Cultivation of spineless cactus (*Opuntia ficus-indica*) in degraded and marginal lands produces feed in water-deficient conditions and also offers possibilities for carbon sequestration and land reclamation. It does not like saline and waterlogged conditions, but thrives in dry conditions, uneven rainfall and poor soils. It has the potential

not only to decrease the carbon dioxide levels in the atmosphere through the gas exchange pattern, termed as crassulacean acid metabolism (CAM) but also to control soil erosion by providing cover and enhancing afforestation. A biomass yield of 180 tonnes per hectare per year has been recorded in Brazil, and under a mixed cropping systems with barley a yield varying from 25 to 100 tonnes has been obtained in Tunisia. The cactus cladodes are low in nitrogen but high in energy and water. A diet containing 60 percent cactus pods, 20 percent chopped hay and 20 percent protein-rich concentrate mixture can support a cow yielding 25 litres milk per day (Dubeux *et al.*, 2015). In Tunisia, a study shows that lambs that were fed on straw supplemented with cactus and saltbush grew at the rate of 80 g/day (Isaac, 2016). In South Africa efforts are being made to produce silage from cactus for feeding to animals.

Enzymes and treatments for second-generation biofuel. Extensive research is undergoing on development of enzymes and treatments to enhance the economic viability of second-generation biofuel production. These could possibly be used for enhancing the nutritional value of straws and stovers for feeding to livestock.

NOVEL FEED RESOURCES FOR DECREASING HUMAN-EDIBLE COMPONENTS IN MONOGASTRIC DIETS

Industrial swine and poultry production account for 55 percent and 71 percent of global pork and poultry production, respectively. These systems will account for over 70 percent of the increases in meat production to 2030, especially in Latin America and Asia. The demand for maize and coarse grains is projected to increase by 553 million tonnes by 2050 as a result of this monogastric expansion, and will account for nearly half of the grain produced in the period 2000–2050 (Herrero *et al.*, 2009). Also, almost 72 percent of the grain used for feeding is in the intensive monogastric sector. Novel human-inedible resources such as insect meals, leaf meals, protein isolates from agro-industrial by-products, single cell protein produced using waste streams, algae, co-products of the biofuel industry, etc. have potential to reduce the use of human-edible components, including soybean, in the feed industry, decreasing food-feed competition and making the livestock sector more sustainable. The feed resources discussed below, though, have higher potential to reduce human-edible components in the diets of monogastric animals, these can also be used in the diets of ruminants.

Distillers grains. These are co-products of the bioethanol industry. Cereals such as maize, wheat, sorghum and barley are fermented to bioethanol. The mass of the dried distillers grains recovered after distillation of bioethanol is approximately one-third of the cereal mass taken for bioethanol production. Global yearly production of distillers grains is approximately 48 million tonnes. These are extensively used as livestock feed. For example, in the United States of America, the beef industry uses 66 percent of the available distillers grains, the dairy industry 14 percent, swine industry 12 percent and poultry industry 8 percent.

Insect meals. Food waste can also be used as a substrate for rearing insects such as black soldier fly larvae, maggot meal and mealworm larvae. These contain approximately 50 percent crude protein with good amino acid composition, and can replace 50 percent of the conventional feed resources such as soymeal and fishmeal in the diets of poultry

and fish (Makkar *et al.*, 2014; Tran, Heuzé and Makkar, 2015). These approaches convert “disposal problems into opportunities for development”.

Leaf meals and protein isolates. Moringa oleifera is a very fast growing plant. Moringa, if grown as a fodder plant, contains on average 16–17 percent crude protein while the leaf meal (without twigs and stems) contains 25–26 percent crude protein. The quality of moringa protein, in terms of essential amino acid composition and protein digestibility is very high – as good as soymeal. Under intensive cultivation conditions, moringa protein yield per hectare could be almost five times higher than that of soybean. Moringa leaf meal is also a good source of sugars, vitamins and antioxidants (Foidl, Makkar and Becker, 2001). Moringa leaf meal could be a good replacer of soymeal in monogastric diets, while the twigs and soft stems could be fed to ruminants.

Protein isolates prepared using the principle of isoelectric precipitation from protein rich resources such as white clover, rapeseed meal/cake and sunflower meal/cake could also be good substitutes for soymeal in monogastric diets. The process of protein isolate preparation reduces the content of fibre and antinutrients, if any, in the original materials, making them suitable for incorporation into the diets of poultry and swine.

The use of green chemistry is in vogue and the aqueous extraction of oil from oil seeds is an attractive process because it does not use organic solvents. The enzyme cocktails (a mix of cellulases, pectinases, proteases, etc.) in the presence of water help to extract oil (Yusoff, Gordon and Niranjana, 2014). In addition these enzymes convert proteins to protein hydrolysates, which have higher biological value than the original proteins. These hydrolysates form a good source of amino acids in the diets of monogastric animals (Latif *et al.*, 2015).

Other novel feed resources. Fatty acid distillate and glycerine are co-products of the biodiesel industry, produced at the first and last step respectively in the transesterification process of converting oil into biodiesel. These are good source of energy and can replace cereals in livestock diets. Further research is required on the use of these feed resources in the diets of aquaculture species (FAO, 2014).

Algae co-products (FAO, 2014) and seaweeds could be good sources of protein and minerals. Brown seaweeds have been studied more, and are more exploited than other algae types for their use in animal feeding because of their large size and ease of harvesting. Brown algae are of lesser nutritional value than red and green algae, due to their lower crude protein content (up to approximately 14 percent); however, brown algae contain a number of bioactive compounds. Red seaweeds are rich in crude protein (up to 50 percent) and green seaweeds also contain good protein content (up to 30 percent). Seaweeds contain a number of complex carbohydrates and polysaccharides. For example, brown algae contain alginates, sulphated fucose-containing polymers and laminarin; red algae contain agars, carrageenans, xylans, sulphated galactans and porphyrans; and green algae contain xylans and sulphated galactans. These could be used as prebiotic for enhancing the production and health status of both monogastric and ruminant livestock (Makkar *et al.*, 2016).

Cassava residues or sweet sorghum residues obtained after conversion of starch and sugars present in cassava and the sorghum to bioethanol are also good animal feeds (FAO, 2014). In addition, single cell proteins obtained on growing bacteria and yeasts, especially on waste streams, could also be exploited as feeds. Agro-industrial by-products rich in

starch and sugars such as cassava peel, pineapple waste and culled tomatoes, among others, after their enrichment with low-cost non-protein nitrogen sources such as urea, could be transformed into protein-rich products using bacteria, fungi or yeasts, for use in the diets of monogastric animals.

OVERARCHING PRINCIPLES FOR SUCCESSFUL TECHNOLOGY ADOPTION

Precision feeding. The feed resources need to be delivered to the animal by using the precision feeding approach, i.e. provision of a balanced diet to the animal that meets its nutrient requirements to realize the targeted objective for which it is being raised by the farmer. This could be achieved using simple least-cost ration formulation software or in-line measurement of milk yield and/or growth rate and computer-aided ration formulation and delivery systems. For developing countries, the former is a better approach (Makkar, 2013), and good progress in terms of livestock productivity gains, an increase in income of the farmers and a decrease in enteric methane have been observed in India for instance (FAO, 2011; Garg *et al.*, 2013). In addition, precision feeding enhances efficiency of feed utilization and decreases feed wastage, giving triple gains – increased income, reduced environmental pollution and increased social benefits. All these are the required ingredients for successful introduction of novel feeds (Makkar, 2016b).

Development of a business model around feeding technologies. Some of these technologies, such as urea molasses block, silage making, urea-ammoniation of straws, have been widely promoted to farmers by a number of organizations since the 1980s. However, they have not been widely adopted. In 2011, through an e-conference, the reasons for their (non)adoption despite great efforts of the development organizations in training the farmers on these technologies were investigated (FAO, 2011). Almost all development organizations trained the farmers in preparing for themselves the urea-molasses multivitamin blocks, silage and ammoniated straw. The farmers used these practices until the project provided inputs and technical backup services; however, the use of the technology was abandoned soon after the project concluded. Although farmers are convinced of the benefits of the technology, the reasons for not using the technologies after conclusion of the projects were identified as: unavailability of the inputs or their availability at high costs; preparation of feeds not fitting into the farmers' routine; and preparation of feeds at home being time consuming. However, at places where a private organization was involved in the feed preparation, for example in preparing the blocks, ammoniated straw or silage, the technologies were being used even after the project had terminated. The private organization was making money and so were the farmers. The private organizations were buying the inputs in bulk, which provided them with price negotiating power to purchase them at a low cost. Also, the private organizations had better skills and equipment to produce the feeds in large amounts and of better quality at a lower cost.

Lessons learned from the above are that for wider and successful adoption of a feed technology, there is a need to develop a business model around the technology and bring on board a private company, preferably run by a young entrepreneur. Technical support must be provided to the private company by a local technical/research institution. A three-tier approach (Figure 1), in which technology know-how, available with a public technical/

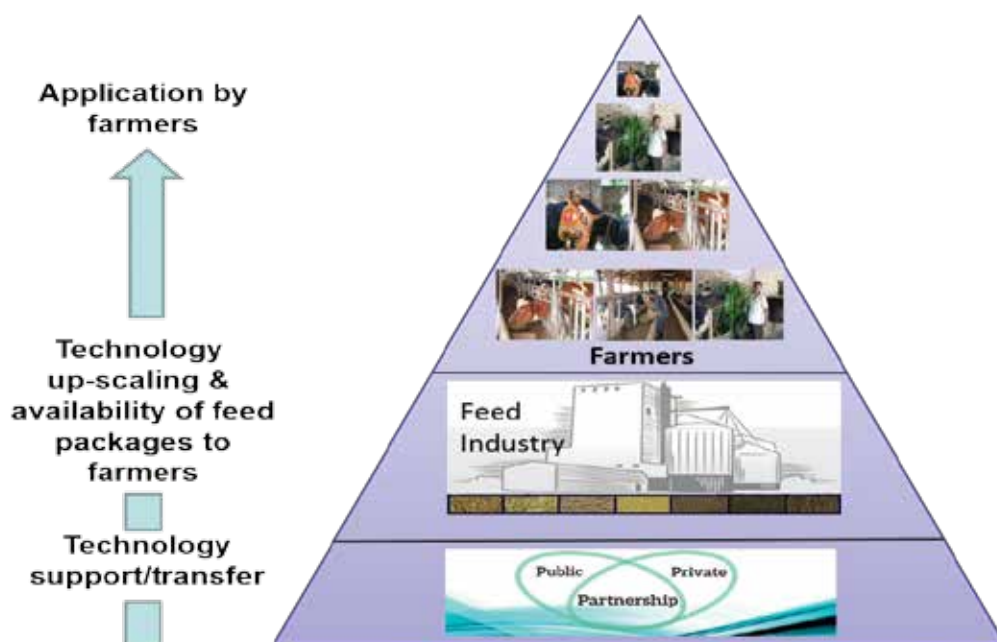


Figure 1. Three-tier business model development around a feed technology and realization of its impact
 Source: Author.

research institute, could be transferred to a private company. Initial teething problems experienced by a private company in using a technology are addressed by the public institution through technical backstopping. The private company works towards upscaling of the feed technology, makes available ready-to-use feed at the farmers' doorsteps and also disseminates the technology widely, leading to its successful adoption. Policies that facilitate provision of loans to young entrepreneurs, or establishment of a revolving fund by donors to give a push-start to the business, will help establish such small-scale businesses. This will create jobs, promote businesses, enhance farmers' profit and bring social benefits.

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The LEAP principles for the assessment of livestock impacts on biodiversity

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ABSTRACT

Most environmental assessments in the livestock sector have focused on greenhouse gas (GHG) emissions. Because of its intrinsic complexity, biodiversity has received less attention despite evidence of the considerable impact (positive and negative) of livestock on wild species and their habitats.

Within the multistakeholder Livestock Environmental Assessment and Performance (LEAP) Partnership whose Secretariat is hosted at FAO, a group of international experts with various backgrounds (ecology, life cycle assessment, livestock production systems) shared their views and developed principles for the assessment of livestock impact on biodiversity. These principles are relevant to a variety of stakeholders and their objective is to guarantee a minimum level of soundness, transparency, scientific relevance and completeness in livestock supply chain assessments.

Key principles include the recognition of the complex and multivariate nature of biodiversity. As a consequence, assessments should clearly state their objectives and conduct a scoping analysis to identify key biodiversity issues (e.g. threatened species/ecosystems or other designation frameworks) in the context of the system under study. Assessments should be capable of reflecting the range of beneficial as well as detrimental impacts of livestock systems. On-farm as well as off-farm impacts on biodiversity should also be included, as those arising from the cultivation of imported feed.

In the absence of more comprehensive assessments of environmental criteria and their linkages with biodiversity, unrecognized trade-offs between environmental issues will remain (e.g. between GHG mitigation option and biodiversity conservation), with the possibility for decisions to shift the burden among different dimensions of agri-environmental sustainability.

LIVESTOCK ENVIRONMENTAL ASSESSMENT AND PERFORMANCE PARTNERSHIP

As the question of the sustainability of food systems takes root, there is a growing recognition of the need for standardized methods and indicators to assess the sector's environmental performance and measure progress to meet targets set in the 2030 Agenda for Sustainable Development. These methods and indicators are required not only to evaluate the environmental performance but also to identify areas where benefits are greatest as well as provide important information for the design of more efficient processes, improving resource use and environmental impacts.

To support this process, the Livestock and Environmental Assessment and Performance (LEAP) Partnership,¹ which is a multistakeholder initiative involving governments, the private sector, academia, non-government organizations and civil society organizations was launched in 2012. The LEAP Partnership aims to build credible and robust accounting methods and indicators that serve as a foundation to address some of the sustainability challenges faced by livestock supply chains. The partnership's leading goal is to improve the environmental performance of the livestock sector, while considering economic and social viability.

LEAP products are essential tools to support the design of effective policies and improvement interventions that can contribute to the achievement of the UN's Sustainability Development Goals (SDGs) such as SDG2 – “End hunger, achieve food security and improved nutrition and promote sustainable agriculture ” – but also SDGs 11 (responsible consumption), 13 (climate action), 15 (life on land) or 17 (partnerships for the goals).

DEVELOPMENT PROCESS

Background

Many assessments and initiatives on the environmental performance of the livestock sector have had a strong focus on GHG emissions (Roma *et al.*, 2015). This was also the case for phase 1 (2012–2015) of LEAP that produced five technical guidance documents on how to measure GHG emissions from the different subsectors of livestock (feed, small and large ruminants, poultry and pigs). Yet, livestock impacts on the environment are not restricted to GHG emissions. In particular, biodiversity is widely affected by this sector, which is a major user of land – about 30 percent of the earth's land surface is dedicated to livestock (Ramankutty *et al.*, 2008). Livestock contribute to each of the five global drivers of biodiversity loss (see Box 1) identified by the Millenium Ecosystem Assessment (MA, 2005), but it can also have positive effects on biodiversity, through the maintenance of unique and species-rich habitats and European semi-natural grasslands, for example (see also Box 1). To tackle the complex issue of livestock impacts on biodiversity, LEAP formed a specific Technical Advisory Group (TAG) in 2014. This group developed the LEAP *Principles for the assessment of livestock impacts on biodiversity* (FAO, 2016), referred to as LEAP biodiversity principles hereafter.

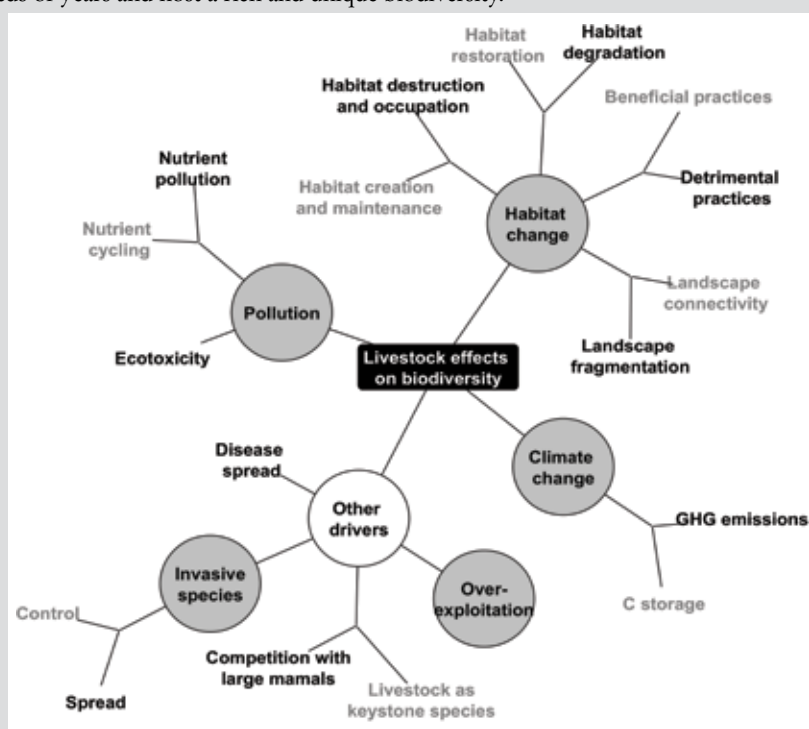
Goal

The LEAP biodiversity principles represent an initial step in which international experts with various backgrounds shared their views on biodiversity assessment. Because of the early stage of the discussions of the topic, the document did not recommend a specific methodology nor provided associated, detailed quantitative guidelines on how to use it to conduct an assessment. The general objective was to develop principles to which the different assessment methods have to adhere in order to guarantee a minimum level of

¹ <http://www.fao.org/partnerships/leap/en/>

Box 1: The wide range of positive and negative effects of livestock on biodiversity

The Millenium Ecosystem Assessment (MA, 2005) recognizes five main drivers of biodiversity loss, depicted as grey circles in the figure below. Furthermore, the figure identifies the specific categories of pressure relevant to livestock systems (black text). It also emphasizes that the link between livestock and biodiversity is not restricted to pressures, and specific categories of benefits are also identified (grey text). Pressure and benefits are often two sides of the same coin and flipping from one to the other depends on management practices and agro-ecological conditions. For instance, livestock systems destroy species habitats when forest is converted to pasture or feed crops, but grazing is the only way to maintain semi-natural grasslands that have existed for hundreds of years and host a rich and unique biodiversity.



Source: Teillard *et al.* (2016a).

soundness, transparency, scientific relevance and completeness. The level of generality of the LEAP biodiversity principles means that they can be used by stakeholders at different scales, including local spatial scales (e.g. farm, landscape, agro-ecosystems), intermediate scales (e.g. territory, supply chain, region) and large spatial scales (national to global). The LEAP biodiversity principles recognize that different users may use different assessment methods to fit different purposes.

Scope

Principles applying to two main assessment approaches are provided, namely: (i) the life cycle assessment (LCA) framework, the quantitative approach adopted by other LEAP guidelines to assess the potential impacts from the various stages of livestock supply chains; and (ii) the pressure, state and response (PSR) indicator framework, which is useful to structure a great diversity of biodiversity indicators and to capture the different facets of biodiversity. The latter is currently a mainstream for many organizations focusing on impacts on biodiversity and ecosystem quality. These approaches can be complementary in application. For instance, while LCA can be used to reveal where potential issues are located spatially or along supply, PSR indicators can be used for further investigation and environmental management.

The LEAP biodiversity principles are intended to be relevant to assessments addressing biodiversity at the ecosystem level (terrestrial or aquatic) or at the species level (plants or animals). Biodiversity at the genetic level is beyond the scope of the principles.

Process

A review of biodiversity indicators and assessment methods (Teillard *et al.* 2016a) was prepared prior to the formation of the LEAP biodiversity TAG, to serve as a common basis for discussion. This document was reviewed and revised by the TAG before publication. The TAG worked from March 2014 to April 2015 – remotely and through three workshops – to develop the LEAP biodiversity principles. The LEAP biodiversity principles underwent a multistep review process: FAO internal review, technical review by three external experts, LEAP steering committee review and a public review.

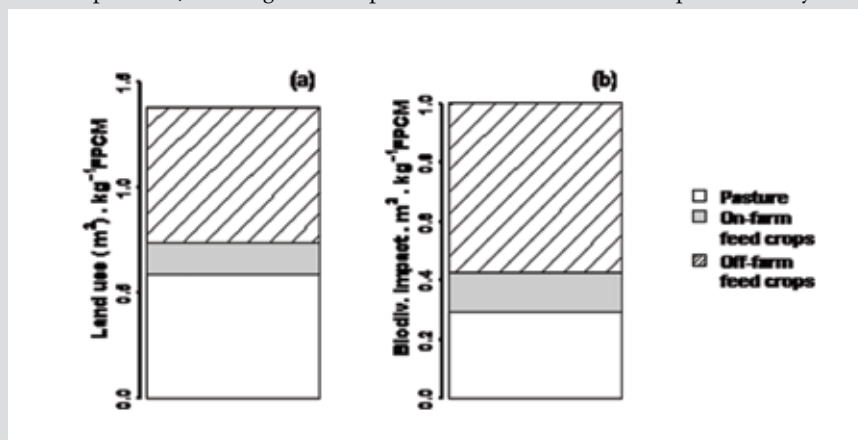
KEY PRINCIPLES FOR THE ASSESSMENT OF LIVESTOCK IMPACTS ON BIODIVERSITY

The following principles are overarching in nature and equally apply to LCA and PSR approaches:

- Biodiversity is complex and multivariate by nature. The assessment of biodiversity is complicated by the lack of a common “currency” for biodiversity, and by it being extremely context-dependent. For a contrasting example from greenhouse gas (GHG) assessments, a molecule of CO₂ has the same radiative forcing no matter how or where it is produced, impacts are potentially global even if the severity can vary geographically, and all GHGs can be expressed in CO₂ equivalents. In contrast, due to societal value judgements, there is great variation in the conservation value of different species and habitats, which complicates decision-making about conservation objectives and priorities. Thus, this will also complicate the assessment of impacts on biodiversity.
- The objectives of a biodiversity assessment and the objectives of any related initiative should be clearly stated, and appropriate indicators and methodologies chosen to reflect these objectives.

Box 2: Off-farm impacts on biodiversity (via land use) can be as great as the farm-scale impacts

Agricultural supply chains are increasingly globalized and, as a consequence, part of the impacts of a livestock supply chain on biodiversity can occur far from the livestock farm. The figure below illustrates the importance of these off-farm, potential impacts for Dutch dairy farms. Imported feed represents a significant share of the farm's land use (a) and associated impact on biodiversity (b). Ignoring off-farm impact would lead to underestimating the total impact and, depending on locations and practices, to change the comparative evaluation of different production systems.



****Notes:** Based on land use from Dutch dairy farm (Thomassen *et al.* 2009), we estimated the impacts on biodiversity by applying the global coefficients provided by Alkemade *et al.* (2009, 2012) to the different land-use areas (in m^2). These coefficients quantify the impact on biodiversity (Mean Species Abundance) for different land-use categories – 0.9 for conventional crops, 0.7 for organic crops, 0.6 for conventional grassland, 0.5 for organic grassland. Undisturbed habitats have an impact value of 0, while a value of 1 means that all biodiversity is lost.

Biodiv. = biodiversity. FPCM = fat and protein corrected milk.

Source: Teillard *et al.* (2016b).

- For all geographical areas within the system boundary, assessments of livestock systems should identify and recognize designation frameworks for biodiversity at both habitat level (e.g. protected habitats) and species level (e.g. protected species, International Union for Conservation of Nature (IUCN) red list, and equivalent frameworks at national and subnational scales). These and related (e.g. WWF) frameworks provide important guidance on the relative conservation value and status of habitats and species.
- The effects of livestock production can have both negative and positive impacts (see Box 1 for more details). To increase the relevance of assessment

methodologies to the livestock sector methods need to be capable of reflecting the range of beneficial as well as detrimental impacts due to livestock systems

- As a priority issue, processes such as feed production, especially off-farm feed production, should be included in the system boundaries of livestock systems (see Box 2 for more details). This is due to its substantial and increasing contribution to overall impacts on biodiversity.
- The choice of reference state (the level of biodiversity that is used as a baseline for comparisons) has a strong influence on the interpretation of results; thus, it is important to clearly describe the situation that is being used as a reference level, and to interpret the results accordingly.

In the LEAP biodiversity principles document, principles specific to the LCA approach, to the PSR approach and its three types of indicators (pressure, state and response) are also provided.

The LEAP biodiversity principles document contains ten case studies. They show concrete examples of biodiversity assessment in the context of livestock and illustrate how the principles can be applied. They cover a wide range of livestock systems, geographical areas and assessment methods.

FUTURE DIRECTIONS

More remains to be done to guide the quantitative assessment of livestock impacts on biodiversity. The LEAP biodiversity principles identify research directions for improving the ecological relevance of LCA methodologies and their applicability to the livestock context. They include the need to develop methods covering different categories of pressure, reflecting both positive and negative impacts of livestock on biodiversity, discriminating different livestock production practices, considering spatial and landscape scale processes, differentiating the conservation value of different species and assessing ecosystem services.

New activities on biodiversity will be launched in 2017 as part of phase 2 of LEAP (2016–2018). Priority will be to identify best performance indicators for biodiversity, in order to move from principles to more detailed and quantitative guidelines. The ultimate goal is to progress towards comprehensive environmental assessments of the livestock supply chains. This goal is challenging, but a necessary requirement for environmental management of feed and livestock production systems. In the absence of such more holistic approaches, then there will remain the risk of pollution swapping, and unrecognized trade-offs among different dimensions of agri-environmental sustainability.

ACKNOWLEDGEMENTS

The Technical Advisory Group (TAG) on biodiversity developed the core technical content of the Principles for the assessment of livestock impacts on biodiversity. The TAG was led by John Finn (Teagasc, Ireland) and Mohammed Said (International Livestock Research Institute, Kenya) who coordinated the activities of the TAG with the support of Félix Teillard (FAO), Technical Secretary of the biodiversity TAG. The LEAP Secretariat and LEAP Steering Committee also contributed to the development of the document

through technical inputs at various stages. The biodiversity TAG was composed of: Rob Alkemade (Netherland Environmental Assessment Agency – TAG member until March 2014); Assumpció Anton (Institut de Recerca i Tecnologia Agroalimentàries, Spain); Bertrand Dumont (French National Institute for Agricultural Research); Fernando R. Funes Monzote (Sociedad Científica Latinoamericana de Agroecología, Cuba – TAG member until August 2014); Beverley Henry (Queensland University of Technology, Australia); Danielle Maia de Souza (Swedish University of Agricultural Sciences, Sweden); Pablo Manzano (IUCN Commission on Ecosystem Management, Kenya & Autonomous University of Madrid, Spain); Llorenç Milà i Canals (United Nations Environment Programme, France); Catherine Phelps (Dairy Australia, Australia); Sandra Vijn (WWF, USA); Shannon R. White (Government of Alberta and Alberta Biodiversity Monitoring Institute, Canada); and Hans-Peter Zerfas (World Vision, Germany – TAG member until March 2014).

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Biodiversity in standards and labels for the food industry

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ABSTRACT

Besides climate change, the loss of biodiversity is one of the largest fundamental challenges of our time. The food producing and processing industries have significant impacts on biodiversity. Currently, biodiversity, ecosystem services and their protection continue to play only a minor role in the food industry, even though their fundamental importance is well known today. The loss of biodiversity threatens economic foundations, especially those in the food industry that rely on nature for their supply of raw materials.

In 2013, the Lake Constance Foundation and the Global Nature Fund screened the policies and criteria of 19 standards regarding their relevance for biodiversity. The project aimed to motivate standards and quality labels in the food industry to better integrate the conservation of biodiversity into standard policies and into their criteria for products and agricultural production types. Overall, the analysis confirms that standards and labels still have significant potential for improving their performance in relation to biodiversity. In a next step, the project partners developed recommendations for policies for the standard organizations and concrete criteria and measures for biodiversity protection. The focus was on the optimization of existing criteria, new criteria for aspects that are not yet taken into account as well as general recommendations regarding definitions, capacity building and monitoring for standard setting bodies.

In August 2016, the Lake Constance Foundation, Global Nature Fund, Fundación Global Nature (Spain), Solagro (France) and Instituto Superior Técnico (Portugal) started the new EU-LIFE project “LIFEBioStandards – Biodiversity in standards and labels for the food industry”. The main project actions are:

- screening of 40 standards/labels + recommendations for criteria + individual assessments for standards and companies with own requirements for the supply chain;
- elaboration of a biodiversity performance tool to operationalize criteria, increase the quality of measures implemented and support auditing and monitoring;
- elaboration of training modules for certifiers and assessors of standards product or quality manager in companies;
- implementation of pilot projects to increase biodiversity performance in five agricultural production types;
- elaboration and implementation of a two-level monitoring system for standards and labels;

- creation of a sector-specific Initiative, “Biodiversity performance in the food sector”, with a basis standard for biodiversity protection and the continuation of training and monitoring.

All stakeholders are invited to join the new project by participating in the discussions, workshops and training and by supporting the implementation of the project actions.

AGRICULTURE AND LOSS OF BIODIVERSITY

Next to climate change, the loss of biological diversity is one of the largest and most fundamental challenges of our time. The food producing and processing industries have significant impacts on biodiversity. Currently, biodiversity, ecosystem services and their protection continue to play only a minor role in the food industry even though their fundamental importance is known today.

Numerous studies have documented the dramatic progression of biodiversity loss. The WWF’s Living Planet Index, the Zoological Society of London and the Global Footprint Network all describe the dying out of species occurring in oceans, freshwater bodies and terrestrial ecosystems. The Global Living Planet Index shows a decline of 52 percent between 1970 and 2010. This suggests that, on average, vertebrate species populations are about half the size they were 40 years ago.

The *Global Biodiversity Outlook 4* and underlying research reports commissioned by the Secretariat of the Convention on Biological Diversity give an overview of biodiversity loss and describe dramatic global scenarios and trends associated with it (CBD, 2014).

According to the Federal Agency for Nature Conservation of Germany (BfN – *Bundesamt für Naturschutz*), the main reasons for biodiversity loss are (http://www.bfn.de/0304_fakten.html):

- **Destruction of habitats:** direct destruction of habitats (e.g. the construction of settlements and infrastructure, cutting down, burning, mining, drainage, overfishing, industrial agriculture) leads to a global loss of biodiversity.

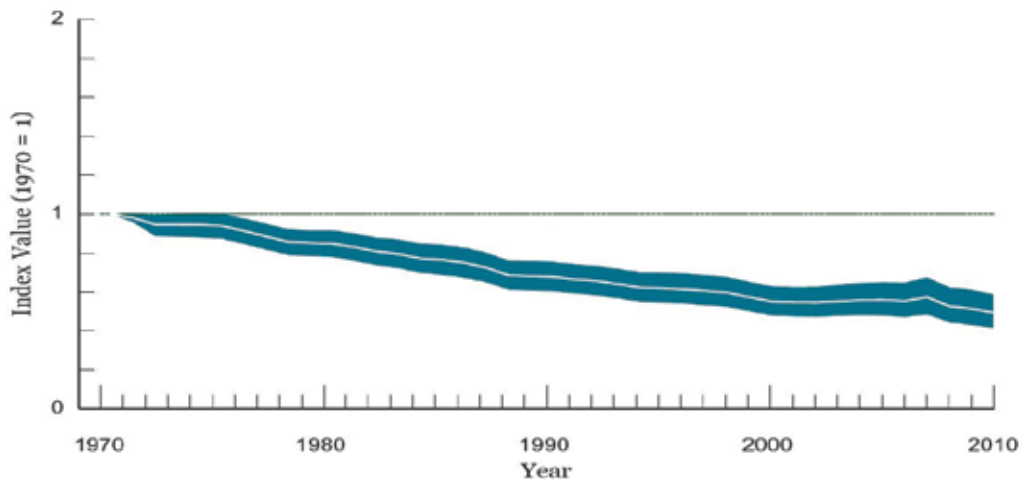


Figure 1. WWF Global Living Planet Index 2014

- **Overexploitation and degradation:** overexploitation and degradation lead to a reduction of biodiversity. Examples include overgrazing, soil erosion, habitat fragmentation, unsustainable use of firewood, use of pesticides, impacts of pollutants, water pollution, unsustainable tourism, unsustainable agriculture, and unsustainable fishing and hunting.
- **Land-use changes:** changes in agricultural practices lead to an increasing loss of agricultural biodiversity. Some reasons, among others, are the abandoning of extensively used areas (e.g. moderate grazing) and the intensification of agriculture (e.g. conversion of grassland for agriculture).
- **Invasive species:** willingly or unwillingly outside of their natural range, non-native invasive species can threaten and displace native flora and fauna.
- **Climate change:** changes in environmental conditions that progress too rapidly can outpace the rate at which species can adapt. Climate change will bring a massive loss of biodiversity.

Based on the list above it can be noted that agriculture is a main driver for the dramatic loss of biodiversity due to:

- Pesticides
- Synthetic nitrogen fertilizers
- Land consolidation
- Drainage
- Use of heavy machinery.

In the FAO Food wastage footprint, agriculture is defined as one of the main influencing factors that threaten biodiversity worldwide. *“Farming, including conversion of wild lands and intensification, is a major threat for biodiversity worldwide. (...) Threats to biodiversity are considerably higher in developing countries than in developed countries: on average, crops are responsible for 44 percent of all species threats in developed countries, compared with 72 percent in developing countries”.*

FOOD STANDARDS AND BIODIVERSITY

The conservation and sustainable use of biodiversity are not just environmental issues but also prerequisites for economic production processes, services and quality of life. The loss of biodiversity threatens economic foundations, especially those in the food industry that rely on nature for their supply of raw materials.

Standards and labels set an example, can steer societal development and should ensure the protection of the environment and biodiversity with certifications that surpass legal requirements. In addition, certified farm operations and companies that are committed to the protection of biodiversity are better prepared for future changes in legislation, and enjoy a competitive advantage sought by a growing group of consumers who increasingly make decisions based on ethical criteria. One out of four consumers (26 percent) makes purchasing decisions partly based on ethical criteria such as sustainability, fair trade or animal welfare (Federal Association of the German Food Industry, BVE, 2013). Overall, consumer demands for food standards are growing.



Figure 2. Logos of the 19 examined standards and labels

In 2013, the Lake Constance Foundation and the Global Nature Fund screened the policies and criteria of 19 standards regarding their relevance for biodiversity and examined to which extent the existing criteria address critical points in relation to biodiversity and where an urgent need for improving existing criteria exists. The project aimed to motivate standards and quality labels in the food industry to better integrate the conservation of biodiversity into standard policies and into their criteria for products and agricultural production types. The initiative also targeted company-owned standards and requirements for the supply chain from food producers/retailers to motivate them to define biodiversity criteria or to optimize existing criteria.

The results were discussed with representatives from standard organizations, companies, farm operations, audit companies and environmental experts. These findings were published in the *Baseline Report* (English and German, available at <http://www.business-biodiversity.eu/default.asp?Menu=229>). The most important findings are summarized below.

Standards policies and strategies

- Only a few standards define the terms used within them such as “biodiversity”, “protected areas” and “areas of high ecological value”. This results in neither the certifiers nor the farm operators understanding the concrete meaning of these terms, leaving them up to individual interpretation.
- The impression arises that the current debate over business and biodiversity has gone partially unrecognized by the standards. At the same time, largely popular concepts such as “no net loss of biodiversity”, the “mitigation hierarchy” for minimizing negative impacts to biodiversity and the role that ecosystem services play for (agricultural) companies are scarcely mentioned.

- Standards and their criteria make reference to the farm operation as a closed system while failing to make it a goal to minimize ecosystem destruction beyond the bounds of the operation's property lines. These externalities include things such as landscape fragmentation, pesticide drift, erosion, water table depletion and effluent runoff. The impacts of products delivered for the farm's operations should also be considered along with these other externalities.
- Only a few standards' organizations offer certified farm operations training on the various aspects of biodiversity. This is urgently needed so that farm operators receive the support they require to understand this complex field of activity and to guarantee the proper implementation of measures. There are numerous studies, information and examples that the standards' organizations could provide to certified operations.

Biodiversity-relevant criteria

- Criteria that define the minimum size of ecological structures and the quality of measures are particularly effective. Specifying the minimum size of ecological structures is probably easier for standard organizations than defining the quality of a measure because, in the latter case, differences between regions and operation sites must be considered. Therefore the tendency arises to offer a selection of measures that take regional particularities into account.
- In most standards, a baseline assessment is not required. However, measuring/recording baseline data is necessary for the implementation of criteria – for the development of action plans, for example. Moreover, the impact of implemented criteria can only be assessed if baseline data are recorded and monitoring is conducted.
- The question is: how detailed the baseline assessment should be so that it provides meaningful data while at the same time not overwhelming the farm operator? Standards should require at a minimum the mapping of existing habitats at the operation site and areas adjacent to it. Operations in or adjacent to protected areas or "high conservation value areas" should also record animal and plant species that have been classified by the government as a protected species or have been placed on the Red List.
- International standards focus on the protection of primary ecosystems while standards for European countries focus on preventing the overexploitation of farmlands especially on reducing pesticide use and nutrient surpluses. However, the standards need to give overall priority to the protection and preservation of intact habitats and ecosystems by incorporating respective criteria. The conditions for certified farm operations should always exceed those required by law, but most standards only require that they comply with current laws.
- Creating scattered "natural islands" is only partially effective. Nonetheless, hardly any criteria require improved habitat connectivity through the use of land and linear structures.
- Standards can increase the quality of natural areas by providing guidelines/examples/consultancy offers that give advice on how to take agricultural land out of production and restore natural habitats. Habitat quality can also be monitored with the help of

a few indicator species. Standards' organizations should motivate farm operators to seek regional expertise and provide their corresponding contact information.

- Unfortunately, the protection of crops and livestock diversity is only included in very few standards. Criteria are missing that motivate farm operators to engage with this issue. Standard organizations should also leverage their influence over food retailers in order to re-introduce heirloom/heritage varieties into the market.

Monitoring the effects

- The ability to monitor the effects of criteria is an essential requirement and also a challenge for all standards. Currently, few auditors can assess whether a habitat is intact and/or worth protecting or if it is more appropriate to implement a biodiversity action plan. Certifiers/auditors/inspectors need urgent training in all aspects of biodiversity.
- None of the standards or labels currently undertakes a structured monitoring of biodiversity indicators – either at an operations-based or higher level. However, standards and labels should prove that they make a contribution to preserving biodiversity. Monitoring is an activity that standards' organizations should conduct together. A shared, regionally-based monitoring system for various standards would be reliable and more cost-effective.

Overall, the analysis confirms that standards and labels still have significant potential for improving their performance in relation to biodiversity.

BIODIVERSITY RECOMMENDATIONS FOR FOOD STANDARDS/QUALITY LABELS

In two expert workshops and with extensive commenting, recommendations for policies for the standard organizations and concrete criteria and measures for biodiversity protection in biodiversity management on the farm and very best agricultural practice were developed. The bases for the development of the criteria are the conclusions in the Baseline Report. The focus was on the optimization of existing criteria, new criteria for aspects that are not yet taken into account as well as general recommendations regarding definitions, capacity building and monitoring for standard setting bodies.

An effective biodiversity management includes the protection of primary and semi-natural ecosystems, a biodiversity risk analysis for agricultural land as well as a meaningful biodiversity action plan at farm level. The plan should include measurable goals, concrete measures for the protection of ecological structures, of protected and endangered species, as well as measures to promote species, varieties and structural diversity. To ensure a high quality of the biodiversity action plan, the standard organizations must specify the requirements regarding structure and content. This includes asking for advice at local or regional nature conservation authorities or environmental organizations. Biodiversity action plans should be reviewed and updated every three years.

The recommendations emphasize that best practices in agriculture are not sufficient to halt the loss of biodiversity. A very best practice for more biodiversity is needed when it comes to the areas of soil protection, fertilizer management, crop protection and water

use. Recommendations are also available for these areas. The protection of biodiversity is complex, i.e. standard organizations should have training for assessors and certified operations. In addition, certifiers and auditors must be trained in order to assess the quality of the implemented measures. The recommendations include also that environmental organizations and nature conservation authorities should be included as they have the necessary know-how of regional biodiversity.

Furthermore, the document contains recommendations for food distributors and food producers: The costs for improved biodiversity protection must be covered by the processors and retailers at a fair share. Price dumping is always at the expense of the environment and the social benefits and must be stopped.

The recommendations are published in the document Recommendations (English and German, available at <http://www.business-biodiversity.eu/default.asp?Menu=229>).

NEW LIFE PROJECT “LIFEBIOSTANDARDS” 2016–2019

In August 2016, the Lake Constance Foundation, Global Nature Fund, Fundacion Global Nature (Spain), Solagro (France) and Instituto Superior Técnico (Portugal) started the new EU-LIFE project “LIFEBioStandards – Biodiversity in standards and labels for the food industry”. The main objective of the project is to improve the biodiversity performance of standards and labels of the food industry by motivating standard organizations to include efficient biodiversity criteria into their schemes, and of food processing companies/retailers, by motivating them to include biodiversity criteria into their sourcing guidelines. The specific objectives are:

- **Application of a biodiversity performance tool:** A tool to operationalize the biodiversity criteria on certified farms, to assess the quality of implementation and to support monitoring.
- **Demonstrate the applicability of biodiversity criteria/measures:** By implementing five pilot projects in certified farms (arable crops, permanent crops, dairy production and meat production). The applicability will be demonstrated to standards’ organizations.
- **Capacity building to increase the quality of biodiversity measures on farms:** Capacity building of certifiers/auditors, assessors and managers of certified farms to increase the quality measures implemented in certified farms. A training module for product managers and quality managers of companies will also be elaborated.
- **Initiative “Biodiversity performance in the food sector”:** Establish a European-wide sector initiative for the implantation of a basis biodiversity standard and the continuous improvement towards efficient biodiversity protection with stakeholders from the food sector (standard and label organizations, food processing companies, producer organizations), environmental and consumer protection organizations.
- **Monitoring of biodiversity:** Monitor the impact on biodiversity of standards and labels for the food sector by establishing a meaningful two-level monitoring system.
- **Sensitization regarding biodiversity performance:** Sensitize procurement and product managers of companies in the food sector regarding the need to improve biodiversity performance of the supply chain.

The target groups of the project are:

- Standard and label organizations relevant for the food sector in EU
- Certifiers/auditors/inspectors of standards and labels
- Owners and managers of certified farms/companies
- Food processing companies and retailers with requirements for the supply chain
- Companies without own specific requirements
- Procurement managers in local authorities, canteens, hospitals
- Business media and sector-specific media

On the international level the project is embedded in the goals of:

- Convention on Biological Diversity (CBD)
- CBD Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets
- UN 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP)
- Post-2015 UN Development Agenda and Sustainable Development Goals. Biodiversity is included in Goal 14 on oceans and coasts and Goal 15 on terrestrial ecosystems, but also plays an important role in targets under Goal 2 (hunger and food security), Goal 6 (water and sanitation), Goal 11 (cities) and Goal 12 (sustainable consumption and production).
- EU Flagship Initiative on Circular Economy

The work packages of the project are:

- **Screening of 40 standards/labels** with relevance for the German, Spanish, French and Portuguese market and elaboration of recommendations for criteria to improve their biodiversity performance. One focus will be regional standards.
- **Support of standards and companies who want to improve their biodiversity performance.** At least ten standards/companies will be interested in the implementation of our recommendations and will be interested in individual support.
- **Update recommendations of standard policies and criteria** regarding their relevance for the protection of biodiversity.
- **Adaptation of the recommendations for specific product groups** (arable crops, permanent crops and dairy products). Dissemination of the recommendations to standard organizations, companies with own specific requirements, food processing companies, environmental organizations and authorities at national and European levels.
- **Five pilot projects to implement and document biodiversity measures** in cereal cultivation (Germany), tomato cultivation (Spain), olive production (Spain), in grassland used for meat production (Portugal) and grassland used for milk production /dairy products (France). In each pilot, a minimum of ten farmers will implement measures /criteria and document aspects such as additional costs, barriers and short-term positive impacts. The biodiversity performance tool will be tested in the pilots. Furthermore, pilot farms will be involved in the training of certifiers, assessors and product managers.
- **Biodiversity performance tool (BPT):** To assess the impacts on biodiversity at the farm level, the management of the farm itself can be assessed. This can be done with

the Dialecte Tool, which has been designed by the project partner Solagro in 1994 and has been continuously improved. Three approaches will be harmonized to have a suitable tool and methodology for assessing biodiversity at farm level.

- o Level 1: the diversity and surface of ecological structures will be assessed as well as pesticide and nitrogen pressure.
- o Level 2: the management of ecological structures will be assessed.
- o Level 3: a survey of key indicator species will be conducted. Plants are relevant indicators for this survey.

The tool will be implemented in pilot projects in Germany, Spain, Portugal and France and will be revised if necessary.

- **Elaboration of a training tool for certifiers, product managers and certified farms.**

The training will be given in the form of workshops and webinars. Training modules will be elaborated for specific product groups (e.g. permanent crops in temperate areas, permanent crops in tropical/subtropical areas, root crops and dairy products). There will also be a training tool for certified farms and train-the-trainer workshops for assessors.

- **Creation of a sector-specific initiative “Biodiversity performance in the food sector”.** The aim of this initiative is to raise the biodiversity performance of the sector by commonly accepted and implemented priority criteria for biodiversity for the whole food sector. At the end of the project, a European sector initiative will exist with a European round table on biodiversity in the food sector. This initiative will provide ground for more and regular exchanges among representatives from the food industry standards’ organization and other stakeholders.

- **Establish a joint monitoring framework for standards and labels of the food sector certifying in Europe:** The aim of the action is the elaboration and test implementation of a robust systematic approach to monitor the conservation impacts of food standards. The monitoring concept should be used by all standards and labels certifying farms/companies in Europe. There will be two levels of monitoring:

- o Level 1: System-wide monitoring. Data collected for every certified entity through certification applications (e.g. information self-reported by producers) and audits.
- o Level 2: In-depth sampled monitoring beyond the scope of the certification audit by data generated on selected representative farms/companies in different geographical settings and cultivating different type of crops.

- **Implementation of the monitoring framework:** Standards and label organizations are informed and are invited to join the common monitoring approach. Agreements will be made with standards’ organizations and companies to implement the monitoring system and the monitoring system will be handed over to the coordinators of the sector initiative “Biodiversity performance in the food sector”. Action plans regarding the extension and further development of the monitoring system will be elaborated as well as monitoring reports.

- **Communication and dissemination of the project and its results.**

All stakeholders are invited to join the new project by participating in the discussions, workshops and training and by supporting the implementation of the project actions.

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Mountain Partnership Products Initiative

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ABSTRACT

Mountain products have enormous potential to boost local mountain economies and improve the livelihoods of mountain communities, among the poorest and hungriest of the world. The Mountain Partnership Secretariat (MPS)/FAO is undertaking an initiative to create a voluntary certification scheme for mountain products. Worldwide demand is on the rise for quality, high-value foods and beverages produced in mountain areas. However, consumers cannot always distinguish mountain products from others when displayed in the marketplace. The voluntary label will communicate the values of a mountain product, enabling the consumers to make a more informed purchase, and the producers to receive fair compensation. The initiative will focus on farmers' cooperatives and women's groups to improve the whole mountain products value chain.

INTRODUCTION

Mountain people are among the world's poorest and hungriest: according to a recent FAO study (FAO, 2015), one in three mountain people in developing countries is at risk of facing hunger and malnutrition. Mountain peoples are largely disadvantaged compared with lowland peoples. They live in harsh and inaccessible terrains and suffer from lack of investments, infrastructure and training opportunities, as well as from being marginalized, both socially and politically.

For centuries, mountain communities have tapped into their natural resources and ancient expertise producing high-quality and unique products such as coffee, cheese, grains, herbs and spices as well as handicrafts and medicines. While small-scale mountain agriculture cannot compete with the volumes of lowland production, it can focus on diversification and has the potential to tap into niche markets such as organic fair trade or high-end quality ones and fetch premium prices (Wymann *et al.*, 2013).

Mountain products are a great opportunity for improving the livelihoods of many mountain communities by boosting local economies (Slow Food Foundation for Biodiversity, 2013). Many mountain women in particular, who are often left to manage the farms and households as men migrate to lowland areas in search of additional sources of income, can increase their income through the trade of traditional mountain products.

Access to markets, extension services, credit and information are crucial for supporting mountain producers. The potential for exploiting niche and unique products is strongly affected by the remoteness and isolation of mountain areas and lack of key services. In

addition, the high number of intermediaries in the value chain of most mountain products means that producers do not always obtain fair compensation.

Ad hoc packaging, branding and marketing are also lacking. Although there is a demand for high-quality, high-value products from mountains, consumers cannot always distinguish mountain products from non-mountain products when displayed in the marketplace.

THE MOUNTAIN PARTNERSHIP PRODUCTS INITIATIVE

In collaboration with Slow Food and members of the Mountain Partnership, the initiative is establishing at global level a light certification scheme to label mountain products to benefit local mountain producers and help them tackle market challenges.

A global mountain label, supported by adequate value chains and marketing strategy, would highlight the added value of mountain products to consumers. By improving the value chain and removing the barriers to entry into markets, the initiative aims to ensure the conservation and enhancement of biodiversity and enable the supply and the diversification of highly biodiverse traditional products that can be competitive on the market and generate income. A label, which will communicate the main qualities of the product (including its origin and nutritional elements) and the ethical values of its processing, will allow consumers to make a more informed choice and thus allow small producers to obtain fair compensation for their products.

Additionally, a range of sustainable tourism-related services offered in the mountains, such as skiing, climbing, cultural heritage tours, nature trail excursions and hiking, could benefit from the certification scheme. Sustainable tourism allows visitors to discover unique cultures, landscapes and biodiversity; a label would foster their appreciation and assist with their marketing.

THE ESTABLISHMENT OF A TASK FORCE

In May 2015, a workshop was held at FAO in Rome in order to gather a number of Mountain Partnership members from governments and non-governmental organizations already working in this field or with a high potential or interest in the activity. Participants agreed to form a task force in order to move forward with the establishment of the labelling scheme and started discussing the mechanism and guidelines to grant the label.

Participants stressed that, since mountain regions are characterized by ancient and deeply rooted local cultures and traditions, the message conveyed by the label should be adapted to allow for customization and valorization of local identities and differences. Compliance of the scheme with all international treaties, laws and regulations is an essential and mandatory requirement, which is ensured through the assistance of the FAO Legal Office.

FIELD RESEARCH

The first activity on the ground implemented by the task force was a market analysis, with surveys carried out among consumers and retailers to understand their perception of

mountain products and the drivers behind their purchase/offer choices. Also, the surveys helped to identify gaps and needs that may be addressed by the project.

The following members of the task force volunteered to undertake the field research in their territory: Bolivian Mountain Institute (Bolivia), GUFU University (Guizhou Province, China), Pan Himalayan Grassroots Development Foundation and Society for Natural Resource Management and Community Development (New Delhi, Calcutta and Uttarakhand, India), University of Central Asia, Federation of Organic Development “Bio-KG” and the Agency of Development Initiatives (Kyrgyzstan), Centre for Climate Change and Disaster Reduction (Tajikistan), The Mountain Institute (Nepal), Fundación Comunidad (Panama) and Rural Agroindustry Network (Peru). Thanks to their collaboration, it was possible to map behaviour in multiple and diversified areas.

The Mountain Partnership Secretariat analysed all the surveys and shared the results both electronically and at a workshop organized during the “Mountain High! Festival of People & Products” in New Delhi, India, in December 2015, where some of the members of the initiative were present.

The surveys revealed common trends in the different countries. At first, people were not familiar with the concept of mountain products – nearly everyone used mountain products but did not initially realize it. During the interviews, people realized that they consume several products and services from the mountains once they are described as mountain products.

The consumers’ sample overall associated mountain goods with positive values and expressed their appreciation for a label guaranteeing the mountain origin. They also stated their willingness to pay a premium price for labelled mountain products and services.

ELIGIBILITY CRITERIA

In order to obtain the label, products must comply with the guidelines that have been defined by the MPS, Slow Food and the task force.

The eligibility criteria have specific requirements on the ecological, social, cultural and sustainability features of the product. These include the sensorial and aesthetical characteristics of the product, its historical information (including the origin) and links to specific know-how, local culture, traditions and biodiversity.

Eligibility criteria also address the method of production and the organizational structure. Products have to be mainly produced and transformed in mountain areas fully respecting the environment. Small-scale production is the focus – including family farming, small mountain producers, women farmers, cooperatives and producers’ organizations.

Finally, it is crucial that producers receive fair compensation and that profits are equally distributed along the value chain.

The certification mechanisms will follow a participative model, a process that builds upon collective learning, direct involvement of all stakeholders and agreement on the specific objectives to be achieved. The participative certification is carried out in a limited and well-defined territory, so the specific certification processes will differ from one area to another according to their contexts.

THE NARRATIVE LABEL

The Mountain Partnership Products label is a voluntary mechanism, backed by a value chain and marketing strategy, to support small mountain producers from developing countries obtain fair compensation for their quality products. It communicates the values of a mountain product, enabling the consumers to make a more informed purchase and producers to sell at a premium price.

The Mountain Partnership Products label will be written as a narrative label that integrates, but does not replace, any existing label mandatory by law in the country. It is a customized narrative label that tells the story of a specific product, in an emotional manner, and highlights what makes the product unique by providing information that is not included in a typical commercial label.

PILOT PRODUCTS

The Mountain Partnership Products Initiative is currently in its pilot phase. Task force members provided a list of potential products to be involved in this exercise, among which two products have been selected: black amaranth from Bolivia (Figure 1) and dried apricots from Kyrgyzstan (Figure 2).

The Mountain Partnership Secretariat (MPS) and Slow Food jointly visited Bolivia in May 2016. They met with a number of small producers, communities and cooperatives in the Chuquisaca area with the support of Fundación Pasos, a non-profit organization that builds the capacity of small producers to sustainably cultivate crops and improve their access to markets.

Amaranth is a quality and high nutritional value crop, but it is not selling well on the Bolivian market. The price for a 46-kilo bag dropped from USD130 in 2015 to USD45 in 2016, due to unusual climate events and excessive undifferentiated supply. Multiple producers tended to arrive at the market at the same time with the exact same product, the Oscar Blanco variety of amaranth, often obliging them to sell below production price.

The strategy jointly identified during the mission to address these issues relies on product differentiation. Starting in December 2016, a group of volunteer family

producers will plant a traditional local variety of black amaranth, which is different in colour and nutritional characteristics from the more commonly marketed Oscar Blanco – with support and training from the MPS and Fundación Pasos.

For the traditional local variety to be successful on the market, it was deemed necessary to create a rise in its demand. With MPS facilitation, Martha Cordero, President of Irupana,



Figure 1. Amaranth field in Bolivia

Source: Alessia Vita, Mountain Partnership Secretariat/FAO.



Figure 2. Dried apricots in Kyrgyzstan

Source: Alma Uzbekova, University of Central Asia.

a company specialized in organic food production and Andean cereals, joined the Mountain Product Initiative and committed to purchasing the black amaranth at a premium price, securing the producers' income. The product will be marketed through a specialty line, the packaging and labelling of which will be developed thanks to MPS support, to ensure that, in addition to compulsory label information, a description of the product's quality is provided. The products will bear the label starting in May 2017.

Parallel to the field mission to Bolivia, the MPS also visited the Farmer Cooperative "Alysh Dan" in Kyrgyzstan with the support of the University of Central Asia. The cooperative produces organic dried apricots and is a member of the national network Federation of Organic Development "Bio-KG".

The annual potential capacity of Alysh Dan for processing apricots is 300 tonnes that come from its 150 hectares of apricot orchards.

Alysh Dan is striving to increase the number of organic farmers in the Batken region of Kyrgyzstan to meet the volume demand of international markets and thus to improve the livelihoods of local communities. There is a great interest from German buyers, but logistic issues must be solved for the successful supply contract.

The value chain analysis allowed for the identification of the main bottlenecks. In particular, the current storing warehouse is not suitable to store food safely year-round, hampering the sale. The MPS is funding the construction of a new warehouse with a refrigerating system for storing the dried apricots using sandwich panels, a special roof and foundation to ensure proper insulation of the food stored. Sandwich panels have been selected because they are cost-effective, keep the food safe from dangerous micro-organisms, prevent their rotting and moulding, and have high resistance to various chemical substances.

Having such a warehouse will increase the overall efficiency of the value chain and in turn increase the income of the farmers.

THE WAY FORWARD

The Mountain Products Initiative will now focus on completing the activities in Bolivia and Kyrgyzstan while moving forward with more products in other geographical areas among those already identified by the task force. The next important event will take place at the end of September in Turin, Italy, during the *Terra Madre Salone del Gusto* fair organized

by Slow Food. The logo of the initiative, Mountain Partnership Products, will be launched and a prototype of the narrative label will be presented.

Mountain products have a key role to play in sustainable food systems. Not only do they contribute to food security and sustainable food diets but they are a means to improve local economies, preserve agrobiodiversity and maintain the uniqueness of mountain peoples' heritage and culture, developed through ancient practices over the centuries.

Yet mountain producers need assistance throughout the many stages of the value chain. Research, information, capacity development and cooperation can provide mountain peoples with the organization, market links, innovative technology and know-how necessary to expand market opportunities, both in the rapidly expanding urban centres of developing countries and for export to more industrialized countries.

The initiative has attracted an enthusiastic commitment on behalf of many mountain communities, who feel that the theme of mountain products is central to their livelihoods. Several donors have expressed interest in partnering in the initiative. More funding will be required to upscale the activities of the initiative, and ensure the dissemination of best practices, lessons learned and experiences to other mountainous regions.

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For further information visit:

Mountain Partnership website. <http://www.mountainpartnership.org/our-work/regionalcooperation/climate-change-and-mountain-forests/mountain-products/en/>

Food diversity for diverse food systems

Slow Food tools and experience in valorization of food biodiversity for the food systems of the future

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ABSTRACT

Today's food systems face multiple challenges: ensuring access to a healthy, suitable and nutritious diet for everyone; contributing to economic growth and the consequent elimination of poverty; preserving biodiversity and natural resources; coping with climate change; and restoring the central role of agriculture (and farmers) within the food system. The paper highlights the role of biological and cultural diversity as a key tool for the sustainability of the food systems through the experience of Slow Food. Analysing the different Slow Food projects for the valorisation of food diversity and pointing out their systemic approach from raising awareness, improving labelling, modelling, communication and education for consumers, supporting farmers' income and developing programmes to involve both private and public procurement cooks in creating direct links with farmers.

INTRODUCTION: BIODIVERSITY AND FOOD ACCORDING TO SLOW FOOD

Why sustainability is about biodiversity

In 1986, in an attempt to effectively explain the concept of diversity among the organisms that inhabit the Earth, entomologist Edward O. Wilson introduced the term biodiversity during the first American National Forum on Biological Diversity, held in Washington, DC. The term biodiversity indicates the diversity of life on various levels – from the most basic one (gene diversity) to the most complex (ecosystem diversity). It is the result of many components that influence each other and – thanks to this interdependence – live and evolve. “Any change in an ecosystem will sooner or later trigger a chain of transformations which may even involve ecosystems found in remote locations, with repercussions on the entire biosphere. Environmental balances are complex and delicate” (Balboni, 2007). This is why today biodiversity is acknowledged as the greatest richness of the planet.

Paul and Anne Ehrlich – both ecologists at Stanford University – compared the large number of species in an ecosystem with the rivets that keep an airplane together. By randomly popping a few rivets, the structure becomes weaker, and the day when the

aircraft will fail or crash – after exceeding a certain threshold – will come sooner (the “rivet hypothesis”; Ehrlich and Ehrlich, 1981).

Peter Raven (a botanist at the Missouri Botanical Garden) estimated that each time a plant becomes extinct, 10 to 30 other species collapse with it, just like a house of cards (Raven, 1976). Each species that lives on the Earth had an origin, and sooner or later is destined to die. In other words, each age has a rate of physiological extinction. However, the speed at which species become extinct has dramatically increased in the past few decades. According to the estimates by Edward O. Wilson (2010), species are disappearing at a rate of about 27 000 per year.

How biodiversity is related to our food

According to the latest International Union for Conservation of Nature (IUCN) “Red List”, more than one-third of the world’s known animal and plant species are at risk of extinction.¹ The study also reveals that 21 percent of mammals, 30 percent of amphibians, 12 percent of birds, 28 percent of reptiles, 37 percent of freshwater fish, 70 percent of plants and 35 percent of invertebrates are currently classified as endangered.

The main difference between today’s species extinction and those of the past lies in the causes, which are not only natural events with a physiological progress. What we are facing is a true global ecological crisis, which involves land and sea ecosystems and where the main actor – who also bears the most responsibility, putting enormous pressure on natural habitats – is humankind.

The loss of biodiversity is caused mainly by: population growth, especially in the most biodiversity-rich areas (such as tropical areas); the destruction and fragmentation of natural habitats (deforestation, urbanization, development); intensive agriculture; pollution and global climate change; and the introduction of invasive species.

The destruction of rainforests, for example, has accelerated dramatically, with dire consequences for biodiversity as these ecosystems host more than half the world’s land species. Ten million hectares of rainforest are cleared or degraded every year – the equivalent of a football field being cleared every two seconds.

The loss of biodiversity does not only involve wild species, but also agro-biodiversity, namely the animal breeds and plant varieties that, since the birth of agriculture 10 000 years ago, have gradually and consistently been domesticated to be grown or raised to produce food. Agro-biodiversity is reducing significantly and this loss has direct consequences on the food we eat. Out of around 30 000 edible natural species, just 30 crops provide for 95 percent of the entire world’s nutritional requirements. Of these 30, wheat, rice and maize provide more than 60 percent of the calories consumed worldwide (FAO, 1999).

Domestic animal species are in a similar situation. According to the report on the status of animal genetic resources in the food and agriculture sector (FAO, 2007), 20 percent of the races surveyed in the 169 countries involved in the study are at risk of extinction. About 60 percent of these are mammals; the remaining 40 percent are poultry species.

¹ Created in 1948 by the International Union for Conservation of Nature, the IUCN Red List is the largest database of information on the conservation of plant and animal species in the world: www.iucnredlist.org

Biodiversity and food system diversity

Small-scale agricultural systems, which rely on a large number of species, cultivars and breeds, selected for their ability to adapt to different environments are today marginalized. The drastic reduction in agrobiodiversity jeopardizes the survival of local and sustainable farming systems, and vice versa. Local varieties are the most suited to the given climate and soil, and grow best in the area where they have naturalized over the centuries, thanks to human's work. They are more resistant and thus require less external intervention.

As a consequence, local varieties are often both environmentally and economically more sustainable. The same applies to indigenous breeds, which are hardy and have adapted to all terrains and the harshest climatic conditions.

Biodiversity represent a unique and precious genetic, but also cultural, social and economic asset. Without the variety of life forms, life itself would disappear, because living beings would lose the ability to face changes, to adapt and thus to survive. Together with genetic pools, we also lose skills, knowledge and languages. Local economies and cultures are compromised. For all these reasons, “the political cause we fight for is not an ideological choice: it's literally about the survival of the planet” (Massa, 2005).

HOW TO VALORIZE FOOD DIVERSITY

How to map and act to promote food biodiversity

Traditional, local food production can be hard to track down because small-scale producers are often isolated and marginalized from the market, do not belong to associations or cooperatives, are not part of a network and do not organize promotional activities.

Additionally, in the majority of countries in the global south, it is very hard to find genealogical registers of local breeds, lists of native plant varieties or scientific studies of local products.

In order to map species, plant varieties and ecotypes, animal breeds and populations and traditional food products, the oral knowledge held by communities is often the only source available. Cataloguing and mapping research can therefore often be time-consuming and extensive, involving field visits and interviews with women, producers and cooks.

When it comes to artisanal food products, reliable catalogues are even more rare than for plant varieties and animal breeds. In Europe, a system of denominations (e.g. Protected Designation of Origin [PDO], Protected Geographical Indication [PGI]) exists, but this only takes into account a small fraction of the wealth of foods found across the continent. In other continents, it is rare to find systematic work being done on traditional, artisanal foods.

Slow Food believes that biodiversity can only be effectively catalogued, mapped and monitored through the involvement of local communities, not only of producers but also consumers.

SLOW FOOD EXPERIENCES AND TOOLS FOR DIVERSE FOOD SYSTEMS

Tools and experience of Slow Food for the valorization of food diversity

Slow Food promotes and coordinates a series of projects that aims to valorize food biodiversity, by **re-designing local food systems involving different stakeholders** from the producers to the consumers.

ARK OF TASTE

The Ark of Taste² is an international catalogue of foods at risk of extinction. In the catalogue native animal breeds and plant varieties, wild plants used for food, traditional processed foods (breads, cheeses, cured meats, sweets, etc.) are nominated in order to give value to local artisan knowledge (and therefore local economies).

This catalogue, which currently has around 4 000 entries (from 140 countries), is being compiled thanks to the work of a vast network of people, including Slow Food members, students, cooks, producers, researchers, local institutions, agronomists, veterinarians and educators.

One of the key aims of the project is raising awareness among people. By involving people (both professionals and non-professional) in this international **crowd-mapping process Slow Food aims to raise awareness** around the issue of food biocultural diversity (that is otherwise difficult to communicate). People are asked to join the project by nominating products as a first act of valorization.

SLOW FOOD PRESIDIA

The mapping of local biodiversity is also the foundation of the Slow Food Presidia project.

There are now over 500 Presidia (in over 60 countries).³ The project aims to promote communities of producers and traditional food products at risk of extinction. The Presidia protect unique regions and ecosystems, recover traditional processing methods and safeguard native livestock breeds and local plant varieties. Each project involves a community of small-scale producers and provides technical assistance to improve production quality and identify new market outlets, and organizes international exchanges with other producers at Slow Food's major events.

How to monitor results of the Presidia projects

In order to facilitate the monitoring of the Presidia, Slow Food has worked with the University of Turin (Italy) and the University of Palermo (Italy) to develop a method for analysing the sustainability of the projects, combining a large number of parameters (both quantitative and qualitative) and taking into consideration socio-cultural, environmental and economic aspects.

The analysis of each Presidium is based on over 50 indicators (52 for plants, 51 for animals and 54 for food products).⁴

² <http://www.fondazione Slow Food.com/en/what-we-do/the-ark-of-taste/>

³ <http://www.fondazione Slow Food.com/en/what-we-do/slow-food-presidia/>

⁴ http://www.slowfood.com/sloweurope/wp-content/uploads/presidi_europa_ENG.pdf

Examples

Four examples of Presidia projects monitored in a second study of Presidia⁵ in mountain areas are described below.

Bucegi Mountains Branza de Burduf (Romania) – Presidium launch date 2007

This iconic Romanian cheese is made by re-processing cas, a fresh sheep's milk cheese. After fermentation the paste is placed in containers made from pine bark or pig bladders.

The initial situation for this mountain cheese was very complex because none of the producers met regulatory requirements for production or sale. Values on the socio-cultural scale have improved substantially: there is now a group of producers who communicate and discuss with each other, receive technical assistance from veterinarians, and sell cheese under a shared label. A shared ageing facility has been renovated (duly registered with the local health authority) and the Presidium has a good relationship with public bodies.

The initial agri-environmental situation was already good (due to the sustainable methods and natural animal diet), but it should also be noted that this Presidium plays an important role in protecting the habitat and mountain pasture dairy production (which risked disappearing in the whole of Romania). The facility used for ageing was renovated by the Presidium coordinator and made available to everybody; it is partly built into the rock of the hillside and also made of stone, so it is in harmony with the landscape. On the economic scale, the number of producers has risen (thereby acquiring negotiating power that previously did not exist), the quantity of product has increased (from 3 tonnes to 7.5), but, most importantly, Branza de Burduf is now a recognized product that can be sold legally, both on the local market and at national and international events.

Motal (Armenia) – Presidium launch date 2005

This distinctive cheese is made from goat's milk and wild herbs in the Armenian mountains. The broken-up curd is pressed into terracotta vessels, which are turned upside down on ashes for two months, then sealed with beeswax.

This Presidium has achieved progress on the socio-cultural scale, primarily because it has recovered a traditional cheese ageing method that was disappearing (ageing in terracotta jars). It has also successfully brought together producers who had no previous relationships with each other (though a formal association has not yet been created), spread knowledge and consumption of the product and organized numerous training activities (particularly on managing animal health).

There have been no significant improvements on the agri-environmental scale, except for greater attention to animal diet and welfare. Values on the economic scale are still limited due to the low number of producers and animals, but a significant milestone should be noted: aged motal in terracotta had almost disappeared and was not commercially available, while now it can be found on the regional market at various events and in some restaurants.

⁵ <http://www.slowfood.com/slowlife/wp-content/uploads/ING-ricerca-presidi-b.pdf>

Sambucano lamb (Italy) – Presidium launch date 2000

The Escarun consortium, which started the Presidium, first worked to save the Sambucano breed. Numbers were down to a last flock of 80 sheep, but there are now 4 000 animals in the upper Stura Valley. The reintroduction of sheep farming into the mountains has meant better protection of the territory, more care for pastures and the building or renovating of small stone dairies. The Presidium has worked hard to improve the welfare of the animals: the sheds were expanded, the lambs are weaned naturally, the sheep are protected from wolves by lightly electrified fences (fuelled by solar panels) and the animals are not mutilated in any way.

All these aspects are well represented by the value obtained on the agri-environmental scale.

But all three sustainability scales have risen significantly above the threshold level. Values on the socio-cultural scale have doubled and increased three-fold on the economic scale. The main contributor to growth in socio-cultural sustainability is external relationships, with the producers participating in many events and establishing relationships and networks with Slow Food and consumers. There has also been a strong recovery of local identity linked to pastoral traditions (an attractive eco-museum dedicated to pastoral agriculture has been set up in Ponteb Bernardo, there are many exchanges with similar groups of producers and training activities are organized with schools). Local restaurants have revived traditional recipes based on Sambucano lamb.

On the agri-environmental scale, it has not been necessary to make many changes to traditional practices as they were already highly sustainable. Small improvements have been made, with a prohibition on feed containing genetically modified organisms (GMOs) and a requirement to control crossbreeding to further reduce crossbreeds in flocks. Practically no packaging is used: Sambucano animals are sold whole and butchers create the portions as appropriate, using vacuum packing if needed.

There have been many improvements on the economic scale. Farms have constructed new sheds, new pastures have been introduced, the number of herders has increased (in the mid-1980s there were three; when the Escarun consortium was created there were ten members and now there are 60) and stock numbers increased (from the last remaining flock of only 80 animals there are now 5 000 in the upper Stura Valley), products diversified (a workshop has been built to make cheese using Sambucano sheep's milk and the wool is now processed), new commercial channels identified; at one time Sambucano lamb could only be found at local butchers, while now it is also available in a large retail chain, at Eataly, various butchers and local restaurants, as well as many Piedmontese restaurants belonging to the Alliance Between Chefs and Presidia, who offer it at attractive prices. The creation of the Lou Barmaset cooperative has been particularly successful: it slaughters the animals, guarantees traceability and sells the meat at good prices.

Vessalico garlic (Italy) – Presidium launch date 2000

Vessalico, a small village in the Upper Arroscia Valley, is home to an ancient variety of garlic. Cultivation is entirely manual and harvested bulbs are woven into long braids called *reste*.

The excellent values on the socio-cultural scale are due to the fact that the women have always been involved in processing and braiding the garlic (there are now two women owners

but in each family women play a significant role in the activity). Though it is a marginal area, the producers' average age has dropped to 35–45 years. The creation of a cooperative (formed at the start) has required greater interaction between producers and regular meetings, also because almost 70 percent of the garlic is sold collectively. The strongly positive values on the agri-environmental scale are the result of adopting sustainable agricultural practices. The Presidium moved from a conventional form of agriculture to a certified organic system in the early days of its activity. The improvement in economic sustainability is due to a number of factors. The quantity produced has increased (from 2 000 braids to 20 000) and garlic-based preserves are also made now, in the shared processing workshop established by the Presidium. The number of farms has increased (from six to nine) and the area of land cultivated has risen from a few hectares to 20. The market has been diversified: previously the garlic was known at local level and sold at the Festival of Garlic; the festival is still a major market for direct sale, but the increased production has enabled the market to be extended nationally (50 percent), and internationally (almost 10 percent of production), while 10–15 percent is sold online. The price of the garlic has also improved significantly.

DIVERSE FOOD PRODUCTS – DIVERSE FOOD SYSTEMS

Diverse market channel for diverse food products – how to make biodiversity accessible

Slow Food promotes a radical reversal of trends in distribution and consumption methods. We need to encourage a short supply chain, reducing intermediaries along the distribution chain and developing forms of direct sale in the countryside, encouraging access to local and sustainable products and supporting solutions that create a direct relationship between producers and consumers, such as food-buying groups and community-supported agriculture schemes.

Consumers' buying power can affect production and distribution, encouraging the spread of environmentally friendly methods (as happened with organic certification). Citizens must be encouraged to make conscious choices and to adopt ways of eating that are sustainable, prioritizing local and seasonal food, limiting quantities of meat and dairy products and eating more cereals, vegetables and legumes, carefully reading labels.

One of the needs is for legislative instruments adapted to small-scale producers, so that they can access the global market without being overwhelmed by bigger businesses. Measures must also be taken to promote small-scale products and allow them to be sold for prices that reflect their quality. To tackle these needs, Slow Food has started the Earth Markets and Chefs' Alliance projects.

Earth Markets

Earth Markets are farmers' markets created according to guidelines that follow the Slow Food philosophy.⁶ Earth Markets project started, to create farmers' markets that represent

⁶ <http://www.fondazione Slow Food.com/en/what-we-do/earth-markets/>

important meeting points where local producers can offer healthy, quality food directly to consumers at fair prices and guarantee environmentally sustainable production methods. They also preserve the food culture of the local community by giving access to bio-diverse food products.

Slow Food Chefs' Alliance

In 15 countries (including Kenya, Uganda, Morocco, Brazil, Argentina, Ecuador, Mexico, India, Albania, Canada, Italy, the Netherlands, Belgium, Germany and France) a large network is growing, formed of 700 cooks who have entered into an agreement with communities of food producers and their local Presidia.⁷ These chefs committed to cook promoting the regional products and taking an active role by organizing educational events to raise awareness on the sustainability of food systems. Cooks active in different business from restaurants to school canteens have already signed up to the Slow Food Chefs' Alliance, and the network is continuing to grow in other countries.

NARRATIVE LABEL

Slow Food believes that to save biodiversity, we must use it. Too often conservation policies result detached from economic policies of promotion. It is therefore necessary to find more appropriate market formulas, such as short supply chains, and to work to change consumer mentality, using tools such as the narrative label (that the producer can use to describe all of their production processes). Chemical and physical analyses are not enough to judge the quality of a food product, and nor is tasting sufficient. Any technical approach will not take into account everything that lies behind a product – its origin, its story, the processing techniques used – and will not allow the consumer to understand if a food is produced with respect for the environment and social justice. Slow Food believes that the quality of a food product is first and foremost a narrative that starts from the product's origin (the place where it was produced) and recounts all of the subsequent processing steps. Only a narration can give a product back its real value. Slow Food has always emphasized the importance of transparent communication on food labels so that consumers can be properly informed about the quality, healthiness and traceability of the foods they are consuming and therefore make conscious choices.

Which kind of educational activities are possible

Education is one of Slow Food's main activities.

The local Slow Food network also cultivates urban, community and school food gardens in Europe and the rest of the world. Slow Food gardens are based on an understanding and valuing of local resources, starting with the soil, seeds and the biodiversity of plant varieties, and follow agroecological principles. There are over 470 such gardens in Europe and over 2 500 in Africa.⁸

⁷ <http://www.fondazioneslowfood.com/en/what-we-do/slow-food-chefs-alliance/>

⁸ For the list of countries: <http://www.slowfood.com/about-us/where-we-are/>

Slow Food regularly organizes seminars and educational workshops, technical visits to farms and communities, and exchanges between producers in different countries.

Slow Food creates educational materials such as videos, booklets, comics and technical sheets. All materials are written in cooperation with local representatives and are supervised by a network of technical experts.

The basic idea is to create a tight-knit international network of educators; in other words, to train the people who will work at the local level and will be able, in turn, to guide others.

CONCLUSIONS

Biodiversity and the Rubik's cube

Today's food systems face multiple challenges: ensuring access to a healthy, suitable and nutritious diet for everyone; contributing to economic growth and the consequent elimination of poverty; preserving biodiversity and natural resources; coping with climate change; and restoring the central role of agriculture (and farmers) within the food system.

Like in a Rubik cube, it is not possible to solve issues separately as they are strictly linked to each other. An integral approach is needed: challenges must be addressed simultaneously, as all of these elements are interconnected.

Slow Food's commitment is based on a series of coordinated, complementary actions, which include advocacy, awareness-raising and projects run by the network of members at a local level:

- encourage consumers to direct the market with their choices, becoming politically active and aware of the impact of their food choices on the agricultural system;
- encourage producers to adopt the principles of agroecology and preserve agrobiodiversity;
- encourage institutions to bring politicians closer to good practices and the needs of consumers and producers.

Slow Food organizes local, regional and international events, launches campaigns, develops networks around the issue of sustainable agriculture and creates space for dialogue involving stakeholders and decision-makers at local and regional levels.

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Food self-provisioning – the role of non-market exchanges in sustainable food supply

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ABSTRACT

Food self-provisioning (FSP), a non-market source of local foods, is often regarded as an important component of civic food systems. Recently FSP in post-socialist societies has been depicted as a socially inclusive practice compliant with principles of sustainability, unrelated to market transactions. Discourses at the political as well as the advocacy level about the benefits and potentials of food relocalization have been proliferating, while the economic significance of FSP has often been downplayed in the academic literature without presenting quantitative or qualitative evidence about the scope of and motivation for FSP activities. Based on a representative survey, this paper analyses the spatial and social extent of FSP practices in Hungary, a CEE country still in its post-socialist cultural transformation phase. It also explores the motivations for FSP as experienced by producer–consumers.

INTRODUCTION

As the food and feed demand is increasing our current food supply chains create growing dependency on international trade. Therefore food production and consumption are becoming more spatially and socially disconnected. In this context food self-provisioning (FSP), growing one's own food became an important adaptive capacity, a component of civic food systems and a non-market source of local foods (Renting, Schermer and Rossi, 2012). The concept of “prosumers” has been introduced to refer to a combination of production and consumption such as food self-provisioning, which is further characterized by attachment and access to agricultural land, displaying experiences on having or using a garden, field or orchard.

FSP has been examined at various levels (nation, region, household, individual) and through various perspectives (micro and macro) and disciplinary foci. Studies in food security underlined that cities have differing degrees of food self-provisioning capacity but rarely enough to satisfy their own food supply, especially in wealthy capital cities (Porter *et al.*, 2014). At the household level, it is also apparent that local food advocates' well-intentioned slogans to “buy local” or “grow your own food” are not simple transactions; rather, such practices must be considered within the broader food provisioning context (McIntyre and Rondeau, 2011). Home food production as a locally-based practice has been linked to a community's socio-economic development and is also regarded as spaces

of experiential production that reconnect to nature. Rural sociologists further explored that self-provisioning and interhousehold exchange (barter, gift-giving) are prevalent in post-socialist rural Hungary; where household economic behaviour is characterized by labour force attachment and heavy reliance on social welfare programmes (Brown and Kulcsar, 2001). Focusing on the household level (and also on the undervalued family or underrecognized friendship networks), FSP has been recently revisited as quiet sustainability (Smith and Jehlička, 2013) and re-represented as a long-established, widespread, positive, modern, proactive, stable and also innovative practice. Whereas the economic significance of FSP has often been downplayed or coined marginal, Smith and Jehlička (2013) redefined it as “practices that result in beneficial environmental or social outcomes, that do not relate directly or indirectly to market transactions, and that are not represented by the practitioners as relating directly to environmental or sustainability goals” ... “Theirs is not a fulfilment of environmental obligations, an attempt to achieve ‘resilience’, or a response to limits, but the daily practice of a satisfying life. In other words, it is not just that the journey to sustainability is less difficult than is sometimes presented – large sections of humanity may already be on it without the need to proclaim the fact loudly”. This approach also highlights that the organization of life in post-socialist societies is grounded in a plurality of economic practices. Similar revisits of the post-socialist household work practices also contended that the non-commodified economic practices are not some traditional, stagnant, declining, backward, marginal sphere of economic activity but instead are alive and well, and even growing, in these post-socialist societies (Williams, 2005., Williams *et al.*, 2012). Finally, in another article Jehlička and Smith (2011) further argued that household food production in post-socialist societies could be regarded as a practice compliant with principles of sustainability. It is not so much a survival strategy of the poor building on the legacy of irregular food supply in the state socialist area, but a socially inclusive practice flourishing in local agro-ecosystems.

Therefore, the main question this paper explores is how food self-provisioning (FSP) practices and their socio-economic benefits are experienced by producer–consumers in Hungary, a CEE country still in her post-socialist cultural transformation phase. The research considers the extent of and motivations for FSP practices in Hungary. The paper draws upon a mixed methods research design with quantitative (2013) and qualitative (2012–2014) phases conducted in 2012–2013 on FSP to explore agrofood development pathways in a Central European context and reflect upon the underlying mechanisms and processes. According to the research design, the empirical data were collected and analysed in three stages. First, in total ten semi-structured interviews were analysed with people active in FSP, and examined in the light of two policy-maker and two expert interviews. Interview participants were identified through personal contacts and mirrored the heterogeneity of stakeholders in local food communities. Interviews lasted between 60 and 90 minutes, took place at urban settings and in the interviewees own environment (Patton, 2005). All interviews were tape-recorded and transcribed verbatim before data analysis. The data analysis used thematic coding, a combination of meaning-condensation, categorization and meaning-interpretation of the relevant themes (Kvale, 1996). Providing

further context and to cross-check the findings, data were collected through desk research (newspaper articles, advocacy literature) and further interviews with policy-makers and experts. Finally, a national level representative attitude survey was carried out in 2013 with 1 200 personal interviews exploring initial motivations for FSP. Data analysis used crosstabs to examine relationships within the data.

LOCAL FOOD SHOPPING AND PRODUCTION FOR OWN CONSUMPTION

The quantitative evidence comes from an omnibus survey carried out by the Medián public opinion and market research institute through 1 200 personal interviews in November 2013.

The first part of the survey looked at *local food shopping habits* that create the wider context for FSP. For more than two-third of respondents, local food stores are the primary source of food, where 70 percent buy at least once a week. The secondary sources are supermarkets and shopping malls, where 52 percent of the population enter regularly to purchase food. A similar proportion goes into hypermarkets and local markets on a weekly basis – representing 26 percent of the population. Less than 10 percent buy at special local food shops, farmers markets, directly from the farm or discount stores.

Not surprisingly, relating to primary shopping source, we recorded the main differences across people from different residence types. Urban residents frequent supermarkets, whereas rural population prefer local food shops, and go significantly less to hyper- and supermarkets. Residents of the capital (Budapest) shop most often in local markets. Less than one-fifth of the rural population visits local markets on a weekly basis.

Differences between income groups are also apparent. Respondents in top income decile visit hyper- and supermarkets more often, and also they shop most often at local markets. The upper and lower middle-income groups cannot be characterized with any distinct shopping habit, whereas the lowest income groups go less frequently to hypermarkets and local markets.

More than two-fifths of the respondents find the price of local food too high when prompted with the question of what hinders their buying local food more often. One-fifth of respondents find the purchase of local food inconvenient, one-seventh (14 percent) is dissatisfied with quality, and 8 percent simply finds the place of purchasing too crowded. Regarding various income groups, the accessibility of these products becomes apparent: the high price is critical to low-income groups and much less to high-income groups. In high-income groups, we record a marked concern about inconveniences of purchasing and quality of local food products – respondents in low-income groups are much less concerned about inconveniences of purchasing or quality problems. Differences in perception of hindrances are also dependent on residence types: in Budapest people highlight the crowded purchasing places and inconveniences as factors hindering the purchase of local food. Rural residents are much more compliant to crowded purchasing places and quality problems.

The second half of the survey examined the theme of *production for own consumption*. Although the economic significance of FSP has often been downplayed or coined marginal, our survey found an unexpectedly high proportion of FSP in the Hungarian population. As a key result, it became clear that one out of three respondents (36 percent) has or uses

a garden, field or orchard, either by the house where they live or elsewhere. The most important explanations people presented for producing their own food (fruits, vegetables, meat, eggs, etc.) are saving money, or obtaining healthy and fresh food. Still, people often mention collective values as the main motivation, such as family food traditions or gardening as a shared hobby. Only a minority of respondents find FSP a family obligation, or helping relatives, or contributing to environmental protection.

The main division line in FSP is the rural–urban division: almost two out of three (56 percent) of people living in rural areas are active in food self-provisioning, while only one-third of urban dwellers are engaged in production for own consumption; in Budapest this proportion is only 7 percent.

The most active gardeners are typically people without a high school diploma, whereas only a quarter of people with a high school diploma and university diploma are active in gardening.

The most interesting results relate to the quality of life of food self-provisioners. The elderly population is more active in gardening: half of the people above 60 are producing food in their gardens, compared with only one- or two-fifths of 18–39 year olds and 40–59 year olds. The tendency is that people from the lower income groups are more active gardeners: two out of five people in the lowest income quarter as compared with one-fifth of the highest income group. According to the results, less than a fifth exchange or donate one-tenth of their harvest.

As for agro-ecosystem services and environmental sustainability, two-fifths use only natural soil fertilization whereas only one-tenth use only synthetic fertilizers in their land management. As for pest and fungal disease control, people also tend to use natural protection methods.

In summary, food self-provisioning is varied across social groups based on types of residence, schooling, income and age. However, the overall spatial-social extent looks quite democratic and it seems to be a socially diverse practice as all age and income groups as well as rural and urban dwellers participate.

SELF-INTERPRETATIONS OF SELF-SUFFICIENCY

The semi-structured interviews further explored the interlinkages of motivations and collective values around self-sufficiency. The interview excerpts are only illustrative and do not aspire to representativeness. Respondents of different gender, age, educational levels, and occupational background were chosen who produce some food for their own consumption (and also give away/share some) in urban or rural areas but not professional farmers. We present below four main themes with typical verbatims taken from the interviews.

Interviews show that the **socio-economic benefits**, individual motivations and collective values are highly interlinked. Clearly, a main inspiration behind FSP is keeping a family tradition, which according to interviewees brings economic benefits and self-fulfilment:

We have always been gardening since my childhood – I remember my parents and grandparents keeping animals, cultivating the land. This is a family tradition, if one could present so. When we had a bigger garden, we could produce all fruits and

vegetables so that we could preserve, and make marmalade. Altogether this resulted in economic benefits and the feeling that the food contains our work, which gave an extra emotional filling. During the years this changed since we have less land available, and we only keep the emotional part. (56-year-old social worker)

Beyond sharing the harvest, an important point for personal motivation is reconnection with friends, family and the villagers:

My mother is working like crazy and we all follow her. But when it is harvest time the whole family comes to help. ... With the sour-cherry we even organize 'pick your own' campaigns. And sometimes when there is enough harvest we ask workers from the village to come. Grandma is picking the cherry even in her 83rd year. I usually climb up to the tree. And then somebody comes to carry or we take it to the pick up points... (Marketing assistant from Budapest, aged 26)

In this way, the gardening experience extends to a reunion of families as relatives are coming to help:

On weekends grandchildren are coming to pick up beans and the apricot, they always come to help collecting the fruit that they like... I could not do it alone, and they take the produce they gather... Boys do the spraying and I do the hoeing. ... I also keep chickens, 7 left. Before I had 40 but I had to process and deepfreeze. My grandchildren also got some from this... formerly I had some pigs too... (Pensioner, aged 72)

Sharing the harvest is a collective sense of fulfilment that goes beyond the family when friends and neighbours are invited to pick their own. FSP also stimulates informal and experiential learning such as, for example, how to carry out effective weed control:

I do not belong to any producer groups... I do everything alone here. ... Routine advice from neighbours, and a lot of specialist reading. Everything is already documented quite well in books. There is very good professional literature and sometimes I also have hobby gardening books. It is possible to learn these skills. There are some amateurs reporting on uprooting the weed ... and now I have weed everywhere. Imagine that I have to bend two million times to weed out. It is tough going. (Pensioner from Besnyő, aged circa 80)

CONCLUSIONS

Family and friendship networks are an important non-market source and a channel of local foods. In this regard, FSP seems to have a growing future potential as perceived by producer–consumers. Self-sufficiency practices are only partially explainable by saving money, or obtaining healthy, fresh food. Collective values, such as maintaining family food traditions or sharing a hobby are similarly important. As for the spatial-social extent, production for own consumption is democratic: it extends to all ages and income groups as well as rural and urban dwellers. In this way, fundamentally different from the Western world, food self-provisioning brings democratic change in the food system without claiming a radical transformation. The various practices need to be further analysed to understand prospects of more localized, alternative food futures and their potential for learning about local, sustainable food. Apparently, whereas on the macro-economic level

the drive for growth is unquestioned, in everyday consumption culture FSP has already been leading the transformation towards sustainability for a long time.

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Food innovation labs: *from farm to fork*

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ABSTRACT

We need a transformation of our food system that will recognize ecosystems as the basic foundation of societies and economies, and we need to place citizens central in our endeavours to change the system. Hivos and IIED have convened multi-stakeholder coalitions at local level in several countries. We engage with local producers, sellers, governments, and civil society organizations to develop new business models and new public policies to enable more productive and resilient regions.

This paper presents the process and results of our Food Change Lab in Uganda. Together with our partners, we have created political momentum with local and national policy-makers to address the future of food and nutrition security in a region poised for growth. It discusses how to get ‘the system in the room’ and together analyse and plan for the ‘soft infrastructure’ of a food system. It argues that, through a process of bottom-up evidence generation and dialogue, policy choices by local and national authorities can direct plans to work with, rather than against, the interests of food security and inclusive green growth for town and country.

INTRODUCTION

A growing world population, combined with the effects of advancing climate change, presents enormous challenges to our global food system. The existing system, built on large-scale monocropping of maize, wheat and rice, is eroding ecosystems and crop diversity globally. Although there is sufficient food in the world to feed all, some 900 million people still go hungry. In addition, more than one billion people worldwide are overweight or obese, and another two billion are suffering from nutrition deficiencies. Global dietary patterns have changed dramatically over the past 50 years. Today, a large part of the global harvest is being fed to animals and people consume more meat, dairy products, oil, salt and sugar, which can negatively affect both their health and that of the environment. These problems do not just affect developing countries, but consumers and agribusinesses around the globe.

Taken together, the facts make a compelling case for re-examining food systems from a perspective that integrates natural resources, food security, public health and equity. Hivos and the International Institute for Environment and Development (IIED) have partnered in “Sustainable Diets for All”, a global five-year programme, where we work with others to influence policy and practices of markets, government actors and international institutions through citizen action for the promotion of sustainable diets. Three strategies are core to

Sustainable diets defined: A sustainable diet has low environmental impact and contributes to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources (FAO/Biodiversity, 2010).

our approach: working with frontrunners, supporting local actors to generate their own evidence, and creating coalitions of the willing through an “innovation lab approach”.

WORK WITH FRONTRUNNERS

In our view, we need a radical rethinking that recognizes ecosystems as the basic foundation of societies and economies. And in building a new food system, we need to put citizens centre-stage, as we strongly believe in people’s capacity and power to innovate and transform their own environment. Signs of the required transformation are emerging worldwide. Farmers, consumers and the actors that connect them – including those in the informal economy – have more influence and control over the food they grow and eat. Consumers want to know where their food comes from, and appreciate the importance of sustainable diets. Hivos, IIED and local partners work strategically with national and international frontrunners to generate change among both producers and consumers. Hivos Impact Investments invests in small to medium eco- and people-friendly enterprises¹ and Hivos has a history of strengthening the capacity of financial institutions to develop green financial products.²

SUPPORT LOCAL EVIDENCE GENERATION

We work with civil society organizations (CSOs) to influence policies and practices of governments and the private sector to diversify the food system. Central to our approach is supporting CSOs to generate their own evidence to underpin their lobbying and advocacy. Building the capacity of CSOs to generate evidence can improve their effectiveness in challenging unsustainable practices in food production and consumption and in promoting sustainable and healthy alternatives. Consequently, they can reach out to the media, generate public awareness and stimulate policies and practices at local, national and global levels that help make *sustainable diets attainable for all*.

CREATE COALITIONS OF THE WILLING

Lastly, we build coalitions of the willing. We facilitate multistakeholder processes, engaging with producers, (local) governments, the private sector and CSOs to create resilient and diverse regions and cities. An example of this approach is our Food Change Labs, currently

¹ <http://www.hivosimpactinvestments.com/>

² See, for example, http://www.fgda.org/dati/ContentManager/files/Documenti_microfinanza/Green-Inclusive-Finance.pdf and https://www.hivos.org/sites/default/files/greening_agriculture_-_sustainable_agricultural_finance_expansion_programme.pdf

initiated in Uganda, Indonesia, Bolivia and Zambia.³ In Indonesia, the Lab collaborated with partners in Bandung, creating a safe space for dialogue between vendors, local government, consumers and other key stakeholders – against the backdrop of a struggle between informal food vending and urban planning. In Uganda, Hivos and IIED cooperate with the Kabarole Research and Resource Centre (KRC) in the town of Fort Portal, to address the future of food and nutrition security in a fast-growing city and its rural hinterland. In a year-long process, we involved all local stakeholders of importance – usual and unusual suspects – to assess the current situation and jointly vision the future. This culminated in the country’s first People’s Summit on Food, where strong commitments were made. The Uganda Food Change Lab is an interesting case study to describe our labbing process and results.

FOOD CHANGE LABS: INVITING THE SYSTEM INTO THE ROOM

The world is producing more food than ever. Yet, a world where all people have access to sufficient, healthy and affordable food produced in a manner that ensures food security now and in the future is further away than ever. The alarming pace of agricultural ecosystem degradation, the persistence of food and nutrition insecurity, and the growing burden of diet-related diseases – in other words, the global crisis of our food system – are examples of a complex, “wicked” problem that is difficult to tackle with the usual levers of policy. Because of the dynamic interconnectedness of all elements involved, trespassing borders, sectors and notions of causality, a flexible and holistic approach is our best recipe for success. Breakthroughs are possible, especially at the local level, through social innovation and design that involves as much of the system as possible.

“Change Labs” are one method for getting such systemic social innovation under way. They can focus knowledge and evidence from multiple actors, including those rarely given validity or voice in policy. They work from the premise that processes of social change are never linear. Therefore, they follow an iterative process, and they are inherently social. Hivos has a long-standing track record as initiator, convenor and/or facilitator of these types of processes. Together with IIED and long-time Uganda partner KRC, we initiated a Food Change Lab in 2015.

THE FOOD SYSTEM OF KABAROLE REGION, UGANDA

In a context of rapid urbanization, how can towns and their rural hinterlands ensure a future that is food secure, prosperous and green? Such complex challenges face many areas of sub-Saharan Africa, including Fort Portal and Kabarole district in western Uganda. The focus area of the Change Lab is a fertile agricultural area close to the Rwenzori Highlands. The region is a microcosm of the opportunities and challenges of reconciling food production, economic transition, employment, poverty reduction, diet and health, and natural resource protection under rapid population growth. It benefits from longstanding civil society presence, including the KRC, and a tradition of progressive local government.

³ <https://www.hivos.org/activity/food-and-energy-change-labs>

Uganda's national planning document *Vision 2040* calls for "A transformed Ugandan society, from a peasant to a modern and prosperous country within 30 years". It also calls for rapid urbanization, with a dramatic growth of urban population from 13 percent to 60 percent. For example, Fort Portal is slated to grow ten-fold by 2040, from 50 000 to 500 000 inhabitants. *Vision 2040* sees a shrinking agricultural labour force from 66 percent to 31 percent. The remaining farmers and workers will be involved in commercial rather than subsistence agriculture. So *Vision 2040* has profound implications for the food system of the town and its rural hinterland, and provides an important context for a Change Lab.

In order for a lab process to "get the whole system in the room", that system first needs to be framed. Otherwise processes may miss their target, or stakeholders may be missing. Evidence plays a key role here, to build a reasonably comprehensive picture of a food system. In the case of Kabarole district, this evidence, collected by KRC and IIED from the field and from the literature, covers rural food insecurity, trade, environmental health and urban food provision.

Uganda is the food basket of the East African region, and Fort Portal is located in the region that generates significant amounts of these food commodities. Large quantities of food leave Kabarole to neighbouring countries and Kampala and this has been growing. For example, ten years ago, seven lorries of matooke (plantain banana) left for Kampala each week but our research found that, by 2015, this number had grown to 497 lorries per week. Farmers are becoming more commercial and their connection to the market is accelerated by emerging rural trading hubs like Rwimi and Mugusu. A survey of traders in Rwimi was conducted by KRC to find out where they were shipping the produce that they were buying. The figures are striking. Only four percent of agricultural produce is destined to stay in the district.

Despite this increasing production and trade, the region is food insecure. Comparative results on the prevalence of stunting and anaemia in all regions of Uganda show that in 2014, the western region (where Kabarole is located) scores among the highest, with prevalence numbers at 44 percent, similar to Karamoja region, which experiences much more severe climatic challenges. KRC research with rural households in ten sample subcounties in Kabarole district showed that only 41 percent of rural households had an acceptable level of food consumption, leaving the majority 59 percent with borderline to poor food consumption. Diets are changing and not all in a good direction. For example, there is overreliance on matooke to the demise of millet with wide implications on nutrition, especially children's protein consumption. The share of rural households depending on the market for their food needs is growing. There is also little replenishment of soil fertility, so there is a growing gap caused by nutrient mining between actual yields and potential yields.

Interestingly, through our surveys, 'food diaries' and food dialogues, we found that most rural households know what good diets are, so "knowledge" is not an issue here per se. In the countryside, we see a trend where more rural people are buying food instead of growing it. These "net food buyers" may have too little land or have livelihoods that are more oriented to work on the farm. Traditional foods such as millet, which require more

labour to produce or take longer to prepare, are in decline. With the partial withdrawal of the state from public service provision, cash is more important – especially to cover school fees and health costs – so households are more often in the market to sell food and cash crops. These are very relevant data, considering the fact that policy-makers often respond with “sensitization” programmes, in the face of unhealthy population diets.

In the urban area of Fort Portal town, the food system is adapting to the influx of rural people looking for work. The practice of street vending has been increasing rapidly. Our evidence gathering showed that the urban working poor rely increasingly on street food vending for their daily food intake. In common with urban areas across Africa, street food is attractive to people who do not have the money (including for fuel), space (living in crowded accommodation without a kitchen) or time to cook for themselves. A KRC survey of 600 consumers found that price and accessibility drive consumers’ choice for street food. Some street foods such as the popular chapatti are high in energy but low in nutrition. But perceptions of street food as an unhealthy symptom of a Western diet are not the whole story. Some street food is very nutritious, especially the traditional stews of beans and vegetables served with maize meal, matooke or potato, which is served predominantly by women vendors. The law, however, does not recognize street food vending due to an old Public Health Act, resulting in a situation of informal food stalls on the side of the road, where vendors operate without protection or safe infrastructure. Luckily, recently, municipal authorities have taken a progressive view in moving from conflict to co-existence with street vendors, acknowledging that informal food provision is a necessity for a large part of the urban population. Another positive policy development concerns the provision of a local market for the area’s farmers where, for three hours every week, they have the possibility to sell their produce directly to the urban customer.

THE PEOPLE’S SUMMIT ON FOOD

In our Food Change Lab, (citizen) evidence gathering and research was undertaken simultaneously with a facilitated multistakeholder process, where the convening parties provided a safe space for various stakeholders to address these complex social challenges. This local sample of a complex food system (farmers, street vendors, community organizations and policy-makers, among others) was guided through a process of problem definition and exploration towards shared visioning and ideation of possible solutions. Reviewing interactions and the evidence, all stakeholders underlined the warning signs of going for growth without a joined up plan for a “virtuous circle” of rural–urban local economic development. Rural nutrition is poor despite rapid increases in food exports from the region; rural households are cash-strapped and are faced with difficult choices to achieve financial and food security. Exports of food to the capital and to the region are being achieved at the cost of natural resources and the capacity of the region to sustain production over the long term. National plans for urbanization focus on hard infrastructure (especially roads) and a growing formal economy, but we have seen that with the expansion of urban centres comes a growth of the informal economy, including the food system – this is best visible if we look at the case of informal street food markets. The huge opportunities to capitalize on the region’s agriculture through value added and food processing are being overlooked.

The acknowledgement of issues, together with realizing the enormous potential for change, evolved into an idea to organize a “people’s summit on food”, where a wider stakeholder community – including national policy-makers – was invited into the process, to engage with the evidence, and to discuss how to plan for the “soft infrastructure” of the region’s food system.

The summit was a two-day event that drew over 100 people representing different stakes in the local, subnational and national food system.⁴ It was convened under the theme “Charting new choices for the region’s food and farming in the growth of Fort Portal city” to collectively devise policies and actions that can ensure food security, jobs and green growth within Uganda’s *Vision 2040*. The Food Change Lab organized the event, which was hosted by the Fort Portal Municipal Council. Reos Partners – who have developed a track record in the social lab methodology – facilitated the summit through which participants became better informed and involved.

In two days, a range of policy commitments for the region’s food and farming system emerged. Arriving at these policy commitments was possible through engaging people around the evidence, sending them on learning journeys, and setting up round-table discussions and group work. Different groups of stakeholders voiced their commitments, which were aired live on KRC FM radio. These form part of the work for follow up in the Food Change Lab and paved the way for more inclusive participation of the different actors in Kabarole’s food system.

Fort Portal town still has the chance (given its formative phase) to get it right in the transition to city status, resulting in orderly development that works for both town and countryside. To harness these opportunities, the stakeholders would have to focus energies on:

- a) **Planning for growth that accommodates the food system of the working poor.**
Street vendors need to be legally recognized and planned for, as providers of affordable food that can also be safe and nutritious
- b) **Value addition through processing** with Fort Portal town playing a more active role in value-added activities within an agriculture-based economy. This would mean a shift from an administrative-based town to an enterprise-based town that provides a more secure market for the farmers, good non-farm jobs and has a reputation for quality.
- c) **A more regenerative model of agriculture** characterized by:
 - farming that replenishes fertility;
 - higher productivity and quality;
 - more attractive landscape for tourism;
 - protection of soils, watersheds and protected areas.

A group of elected leaders committed to pursue the amendment of the 1935 Public Health Act to reflect the new realities of the emerging food system; local authorities and technocrats committed to support vendors with infrastructure (including public toilets, water points and night lights) and gazetted land where vendors can operate, and to raising

⁴ <https://www.hivos.org/news/peoples-summit-food-charting-new-choices-food>

awareness of food, nutrition and markets. Street vendors committed to strengthening their reputation, their hygiene and compliance with existing and new rules, through awareness and self-regulation; and religious leaders committed to address food and nutrition more often. Farmers committed to work in groups to overcome some of the problems they face such as market prices and promoting of value addition. Lastly, civil society committed to promote stakeholder engagement.

CONCLUSION

The long-standing partnership between Hivos and IIED is an interesting example of the joining of forces of two different organizations. In the Change Lab approach, evidence and citizen agency are core; using citizen-gathered evidence in support of the capacity of people – as individuals and with others – to make choices, to negotiate available options and to challenge the institutions that in turn structure their actions. As we saw in the Ugandan example, making plans for “soft infrastructure” and positive urban–rural links is not straightforward. But through a process of bottom-up evidence generation and dialogue, policy choices by local and national authorities can direct plans to work with, rather than against, the interests of food security and inclusive green growth for town and country. This is an exciting opportunity to build “virtuous circles” of development from farm to fork, that factor in an urban food system of the working poor, add value through processing and promote a more regenerative model of agriculture.

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Innovative markets for sustainable agriculture: exploring how innovations in market institutions encourage sustainable agriculture in developing countries

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ABSTRACT

From 2013 to 2014, the FAO and the Institut National de la Recherche Agronomique (INRA) undertook a survey of innovative approaches that enable markets to act as incentives for the adoption of sustainable agricultural practices. Through a competitive selection process, 15 cases from around the world provide insights into how small-scale initiatives that use sustainable practices have been driven by market demand to create innovations in the institutions that govern sustainable practices and market exchanges. These cases have responded to both local and distant consumers' concerns about the qualities of the food that they eat. Through this study we learned that the initiatives rely upon social values to better adapt sustainable practices to local contexts while creating new market outlets for their products. Specifically, private sector and civil society actors are leading partnerships with the public sector to build market infrastructure, integrate sustainable agriculture into private and public education and extension programmes, and ensure the exchange of transparent information about market opportunities. The results are: (i) system innovations that allow new rules for marketing and assuring the sustainable qualities of products; (ii) new forms of organization that permit actors to play multiple roles in the system (e.g. farmer and auditor, farmer and researcher, consumer and auditor, consumer and intermediary); (iii) new forms of market exchanges such as box schemes, university kiosks, public procurement or systems of seed exchanges; (iv) new technologies for sustainable agriculture (e.g. effective micro-organisms, bio-pesticides, soil analysis techniques, personal protective equipment). We have found that the public sector plays a key role in providing legitimate political and physical spaces for multiple actors to jointly create and share sustainable agricultural knowledge, practices and products.

INTRODUCTION

In 2014, FAO published a study that reviewed the literature on the impacts of international voluntary standards on smallholders' access to markets and conducted a survey of FAO projects that had included a component on certification for sustainable agriculture (FAO, 2016a, Loconto and Santacoloma, 2014). This work, which was based on more than 15 years of FAO experience on these topics, illustrated that local institutions were fundamental to whether or not smallholders accessed markets for sustainable products. We moved on from this work to try to understand how it was that access to markets could incentivize the adoption of the sustainable practices that are included in the standards, as this is actually the more important issue than just the ability of smallholders to become certified.

Beginning in 2013, FAO and the Institut National de la Recherche Agronomique (INRA) began collaborating in order to better understand how changes in market institutions encourage the adoption of sustainable agricultural practices. An open call for proposals of innovations that link sustainable agricultural practices with markets was launched in order to solicit experiences that had not already been documented. We received 87 proposals, of which we chose 15 to be developed into full case studies. We prioritized those case studies written directly by the innovators themselves because we adopted a participatory research approach whereby we wanted to work directly with the innovators to develop and analyse their experiences. The 15 case studies are listed in Annex 1 and we provide a brief classification and summary of their activities according to our analytical framework of institutional innovations.

In 2014 and 2015 we collected data through field visits, interviews, document analysis and extensive peer review by experts in each country. The analysis focused on understanding how innovations in market institutions function as the incentives for the adoption of sustainable agriculture practices in developing countries and was published as an edited book in 2016 (FAO, 2016a). In 2015 we held an international researcher–practitioner workshop in Bogotá, Colombia, whereby we shared knowledge and experiences about the creation of markets for sustainable products and we developed policy recommendations that were published in a policy brief in 2016 (FAO, 2016b).

INSTITUTIONAL INNOVATIONS AS A METHOD FOR UNDERSTANDING INCENTIVES

For the purposes of this summary, we explain how we arrived at dividing the 15 case studies up according to three innovative mechanisms, which we described as multi-actor innovation platforms (IPs), participatory guarantee systems (PGS) and community-supported agriculture (CSA). These are all terms that have been looked at before by other scholars, but we have found them useful to identify slightly different innovation processes that have been facilitating farmers' adoption of sustainable agriculture practices.

Institutional innovations are new rules and forms of interaction. They help redefine sustainable practices for the local level and bring together food systems actors that have not traditionally worked together. Basically, we focus our analysis on how the problems are framed by the people involved – in other words, *what was the problem with agriculture that required a rewriting of the rules*.

We then identified the ways that the stakeholders in each case created their networks and then tried to understand what types of knowledge and practices were prioritized in these activities. We then examined the types of new rules that were created and the ways in which different responsibilities for activities in the systems were assigned to different people or organizations or even processes.

Finally, we took a historical look at the timeline of the case studies, to understand how long they have been collaborating, solidifying the relationships in their networks and in this way institutionalizing their collective action.

HOW DOES A MULTI-ACTOR INNOVATION PLATFORM FUNCTION?

Multi-actor innovation platforms are institutional arrangements where stakeholders gather together to facilitate and to plan the activities connected with the adoption of a specific agricultural technology (Kilelu, Klerkx and Leeuwis, 2013). An IP begins with partnerships located within local research, training or extension bodies and includes farmers as partners. It uses national and international knowledge to promote organic or sustainable agriculture practices.

Initial legitimacy for an IP comes from outside of the group, then builds internally. The focus is on specific technologies and farmer-led experimentation to build up the capacity to produce food sustainably. A new local market is created as an outlet for an increased supply and a desire on the part of farmers to be able to differentiate their products on the market. The most commonly used market form is on-farm sales because of the central role of farmers' own farms as key sites for change in this particular institutional innovation. There are six IP cases in the study and across these we saw changes in the rules for training, extension, production and the allocation of responsibilities among these actors

This brings us to the first policy recommendation that was developed in the 2015 Bogotá workshop: **interactive learning** is essential to adapt sustainable agricultural practices and sustainable technologies to a specific local context. The most frequent approach in these cases is to create and disseminate knowledge in farmer-led experimentation, i.e. knowledge about good agricultural practices is adapted to local contexts through a "learning-by-doing" approach such as participatory experiments in farmers' fields. This way, technical knowledge (such as Integrated Pest Management [IPM] methods) combines with traditional knowledge of local farming systems (such as integrated systems with local crops) and individual farmer knowledge of the agroecosystem.

PARTICIPATORY GUARANTEE SYSTEMS AS INNOVATIONS IN CERTIFICATION AND VALUE CHAIN ORGANIZATION

Participatory guarantee systems (PGS) are alternative certification mechanisms used in organic farming systems and by family farmers practising agroecology. They are localized groups composed of farmers, consumers, researchers, municipal level public officials and local businesses that conduct the farm assessments to ensure that sustainable agriculture practices are being used. According to the International Forum for Organic Agriculture Movements (IFOAM), they are "locally focused quality assurance systems. They certify

producers' [farming practices] based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange" (IFOAM, 2008).

This mechanism begins with partnerships between farmers, consumers and intermediaries (including service providers, organic movements). A PGS uses local and national knowledge (and harmonized international organic standards). Initial legitimacy comes from within the group, then outside recognition. The main focus of the innovation is on an alternative form of certification (based on free or low-cost peer review) and farmer-led experimentation.

New local markets are created based on direct contact with consumers and are produced as a result of the interactions inspired through the participatory certification process. The main sites of market exchange include farm visits, farmers' markets, Internet sales and supermarkets. The main changes are seen in the rules for organic production, internal organization and the sharing of roles and responsibilities among different people within the local groups.

The role of this institutional innovation is to create a local system of production and consumption whereby multiple stakeholders experiment with sustainable agriculture technologies (Rosegrant *et al.*, 2014) but also collectively ensure that the techniques are adopted by setting standards and verifying their compliance (i.e. the governance arrangements) (IFOAM, 2008). Basically, what the PGS does is takes a full value chain – where the different responsibilities for production, trade and consumption are divided among value chain actors – and basically mixes this up into one localized system whereby these roles and responsibilities are reassigned to new actors. For example, farmers and consumers become researchers and auditors. There are six cases of PGS in the study and one of the main points about this mechanism is that local adaptation is very important. Unlike a third-party certification audit, PGS must be adapted to the local conditions in order to provide a credible guarantee.

This need for adaptability brings us to the second policy recommendation regarding farmer empowerment. We found that those farmers who could engage in strategic marketing increased their bargaining power in new and existing markets. By establishing semi-formal price-setting committees that include farmers, intermediaries and consumers (particularly through the PGS mechanism), organizing collective sales and creating physical spaces where new markets can be held, institutional innovations increase farmers' capabilities to negotiate prices that reflect the value-added in sustainably produced products. Therefore, greater support for capacity building and infrastructure that helps farmers to become more strategic about exploiting market opportunities is critical for improving farmers' capacity to benefit from the monetary advantages found in new markets.

COMMUNITY SUPPORTED AGRICULTURE MECHANISMS ARE EMBEDDED WITHIN LOCAL SOCIO-CULTURAL CONTEXTS

Community supported agriculture (CSA) refers to those innovations that are tied to the specific agroecosystems and socio-cultural contexts of their origin (Bair, 2008; Kloppenburg, Hendrickson and Stevenson, 1996). CSA mechanisms are embedded within local socio-cultural contexts and represent initiatives where there is investment by community members in both the production and consumption components of the system.

The CSA mechanisms begin with grassroots entrepreneurial activities to resolve a community concern by relying upon community-based knowledge, and diffusing this through existing networks. The first investments of resources are mobilized from within the community. The CSA practices are then reinforced through internal improvements over time, focalizing more on the purpose – or mission – of the initiative and then building both internal and external legitimacy as the initiative grows over time. Market formation, often in the form of bringing the market into the community, is a result of these reinforcement mechanisms. Change is seen in the rules for how the community creates a protected space to market their products within the local communities.

In these mechanisms, it seems that it is more important to embed the entrepreneurial activities, knowledge and resources within the local context before external legitimacy and strategic positioning of the innovation are sought. In this way the CSA mechanism creates a protected space to market their products within their local communities.

This last point is important in terms of the third policy recommendation, which is to **support communication and trust between farmers, intermediaries and consumers**. When farmers, intermediaries and consumers have direct interaction outside of the market, they build trust that carries over into market interactions. These interactions occur through collaboration in some of the participatory research approaches, through membership in PGS, through consumer study visits to farms and through community events. When these approaches are also linked to direct markets or increased consumer knowledge about current farming practices, we see an expansion of consumer demand.

HOW DO MARKETS INCENTIVIZE THE ADOPTION OF SUSTAINABLE PRACTICES?

As explained above, it is through the changes in the rules and the reallocation of roles and responsibilities among actors who typically do not have the habit of collaborating where we see institutional innovations occurring. Indeed, it is through these institutional changes and the autonomy that they promote that markets provide incentives for the adoption of sustainable practices. For example, greater communication that occurs directly between producers and consumers – particularly through the identification and communication of market demand for specific “qualities” of the products (e.g. safe, organic, good agricultural practices) – provides farmers with accurate information about what they can sell and is a direct influence on what and how they grow their food.

With IPs and CSA, the incentives are found in the creation of local networks that integrate knowledge (creation and sharing), markets, resources and policy support at multiple levels (municipal, national, international trade). For the PGS, the alternative certification mechanisms reduce costs of compliance with standards for organic (or agroecological) production. In this latter case, we found that small farmer inclusion in the value chain is critical, but the important incentive here is not the inclusion of farmers only as producers, but also as auditors and researchers in their PGS. The idea that roles in these local networks are not fixed increases trust among the different actors. Across all of these initiatives, we found that the shifting of roles and sharing of responsibilities between producers, consumers, researchers, intermediaries and public officials creates expectation of

and a prioritization of reciprocity over solidarity. Conceptually this is important because it means that there are possibilities for creating strong network ties among actors who have very different group identities and interests. This is important if we want these types of initiatives to spread and to be resilient over time.

CONCLUSIONS

We can summarize the main conclusions of this study as follows. First, the incentives for adopting sustainable practices can come from the autonomy created when local actors develop innovative rules for market interactions. Second, local actors rely upon social values (e.g. trustworthiness, health [nutrition and safety], food sovereignty, youth development, farmer and community livelihoods) to adapt sustainable practices to local contexts and create new market outlets for their products, which are core components of institutional innovations. Third, even when private actors (farmers, consumers, cooperatives, firms, etc.) are leading the innovations, partnerships with public actors and civil society are fundamental for legitimating political and physical spaces where sustainable agricultural knowledge, practices and products are exchanged through market interactions.

In sum, although most innovations are created by private actors and rely on voluntary systems, public support is essential to scale them up by providing an enabling environment that legitimizes both the sustainable agriculture practices and marketing innovations. Indeed, this was found to be the most important role of public actors in the study.

Public actions need to be taken at subnational, national and international levels in order to support the emergence and growth of these types of institutional innovations. Nationally, public actors create enabling institutional environments by ensuring that their existing policies and incentive structures do not discourage market-driven approaches to sustainable agriculture. More concretely, investment in public infrastructure (e.g. roads, public transport, small-scale storage and aggregation hubs, public spaces to hold farmers' markets) can provide much needed services and support to innovators. Internationally, public actors can collaborate with trade partners to build regional and international alliances around sustainable agriculture through trade policies and equivalency agreements for existing food safety and sustainable production standards.

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ANNEX 1. INSTITUTIONAL ANALYSIS OF THE 15 CASE STUDIES

Country	Title	Framing contests	Network construction	Institutional arrangement	Collective action
Benin	The Songhai Model of integrated production	DF: Organic O: Rural development S: Youth training M: IP	Vertical: Ministry of Education Donors (South–South, North–South) Leadership Horizontal: Alumni network Hotels	IR: Scaling-up strategy RE: Youth training CD: Labelling strategy PA: Quality products and services	Convergence
Bolivia	The ecological fairs of La Paz, Cochabamba and Tarija	DF: Agroecology O: Food sovereignty, Health (nutrition/safety) S: Local economy M: PGS	Vertical: Donors (FAO, Spain) Leadership Horizontal: Producer-auditor Producer-consumer Consumer-citizen School canteens Municipal officials	IR: National organic law & PGS standard RE: Capacity building CD: Local fairs PA: Quality products	Convergence
Colombia	The Familia de la Tierra PGS	DF: Agroecology O: Food sovereignty S: Native seeds M: PGS	Vertical: Restaurants Cooking school Peasant movement Leadership Horizontal: Consumer-citizen Producer-consumer University District-level public institutions	IR: Organic policy proposal, national association RE: University seed research CD: Gourmet consumers PA: Quality products	Developmental
Ecuador	Reinforcing the local systems of healthy food of Sierra Centro	DF: Agroecology O: Health (nutrition/safety) S: Fair trade (local economy) M: CSA	Vertical: National NGOs Horizontal: Consumer-citizen Producer-consumer	IR: Food sovereignty law, national association RE: Field visits CD: Community supported agriculture PA: Quality products	Developmental

India	PGS and the small holder markets: idea of trust and short market chains	DF: Organic O: Health (safe food) S: Native seeds, yields M: PGS	Vertical: Donors (FAO, IFOAM) Long value chains Leadership Horizontal: NGOs Farmer groups Producer-auditor	IR: National organic law, public PGS standard, private PGS standard RE: Field visits CD: Short and long value chains PA: Quality products	Developmental
Indonesia	<i>Partisipasi Inovasi Petani (PIP)</i> project: a participatory model for promoting farmer-driven innovation	DF: Commodity Sustainability O: Farmer livelihoods S: Farmer-driven experimentation M: IP	Vertical: Donors (Mars Inc.) Long value chains University Horizontal: Input providers Farmer groups	IR: Scientific/technical community, GAP standards RE: Farmer experiments CD: Long value chain PA: Quality products	Emergence
Iran	The role of community based organizations in sustainable production and marketing of agricultural products/organizations	DF: Community IPM O: Health (safe food) S: Farmer Field Schools M: IP	Vertical: Donors (FAO) Leadership Horizontal: Producer-consumer Farmer-expert	IR: Development policy RE: Farmer field schools CD: Consumer information PA: Quality products	Developmental
Namibia	The Namibian Organic Association's Participatory Guarantee System	DF: Organic O: Health (nutrition/safety) S: Local economy M: PGS	Vertical: Allan Savory Institute National Organic Movement National NGOs Supermarkets Leadership Horizontal: Consumer-citizens Producer-market	IR: National policy for climate change; national rangeland management policy RE: National Organic Movement CD: Local markets PA: Quality products	Emergence

Nigeria	Impact Assessment of the Community Based Farming Scheme in Enhancing Sustainable Agriculture in Nigeria	DF: Organic O: Sustainable farming S: Youth training M: IP	Vertical: Donors Universities Leadership Horizontal: Community engagement Student training	IR: International Organic standards RE: Student farms CD: Organic kiosk PA: Quality products and services	Emergence
Philippines	The Innovative Institutional Approach: QPGS	DF: Organic O: Community livelihood S: Farmer control over genetic/bio-resources M: PGS	Vertical: Provincial government CSOs University Leadership Horizontal: Producer-marketer Producer-auditors	IR: National Organic Act, Private PGS standard RE: University linkage CD: local markets PA: Quality products	Developmental
Tanzania	Sustainable Agricultural Practices by Smallholders Tea Farmers	DF: Commodity Sustainability O: Health (safety) Farmer livelihoods S: value chain management M: IP	Vertical: Donors Government agencies SAGCOT Leadership Horizontal: Farmer-Processor linkages	IR: Rainforest Alliance standard, government agencies RE: extension CD: Market requirement PA: Quality products	Convergence
Thailand	Moral Rice Program: Dharma Garden Temple	DF: Moral economy O: Community livelihood S: Local economy M: CSA	Vertical: IFOAM Long value chains Leadership Horizontal: Community members	IR: International and local standards RE: Volunteer, training CD: Radio PA: Quality products and services	Developmental
Trinidad and Tobago	The Brasso Seco Paria Community Make Agrotourism Their Business	DF: Commodity Sustainability O: Community livelihood S: Local economy M: CSA	Vertical: Donors (IICA) Horizontal: Community members Sister projects	IR: International standard RE: community association CD: Tourism PA: Quality products and services	Developmental

Uganda	Facilitating social networks through FreshVeggies PGS	DF: Organic O: Health (nutrition/safety) S: Local economy M: PGS	Vertical: Supermarkets National NGOs Donors (UN, Sida) Leadership Horizontal: Producer-consumer Farmer groups SACCO	IR: Regional organic standard & PGS standard RE: National organic movement CD: Facebook PA: Quality products and services	Developmental
Uganda	The role of cooperatives in linking sustainable agricultural practices with market	DF: Organic O: Farmer livelihoods S: Value chain management M: IP	Vertical: Exporter National NGOs University Leadership Horizontal: Farmer groups	IR: Regional organic standard, IMO certification RE: University linkages CD: Long value chain PA: Quality products	Developmental

NB: Framing contests : We can distinguish between definitional framing (DF), which establishes the core identity for the actors, the objective (O) of the innovation, the solution (S) to the problem and the mechanism (M) through which to achieve the innovation.

Network construction: Vertical network construction is used to create external alliances that ensure access to markets and/or provide a competitive pressure for improvement. We see horizontal network construction occurring as a way to build cohesiveness within the group.

Institutional arrangements: Institutional arrangements are those institutional and industrial infrastructures that provide political and market opportunities for the products produced through sustainable practices. We distinguish between institutional regulations (IR) (e.g. laws, standards, agencies, associations, scientific/technical communities), resource endowments (RE) (e.g. knowledge, finance, insurance, training), consumer demand (CD) (e.g. creation of environmentally-socially-health-conscious consumers) and proprietary activities (PA) (e.g. quality products).

Collective action: This is the contested political process through which innovations emerge . These processes include the ways in which the solutions are framed, how the network of actors is engaged and the political and market opportunities that exist at a particular moment in time. Following from the information provided in the first three indicators, we can consider the progress of collective action according to three phases: emergence, developmental and convergence. By understanding how far advanced the collective action process is, we can thus discuss whether or not these innovations are currently considered legitimate solutions to the problem of unsustainable agricultural practices.

IP = Multi-actor innovation platform. PGS = Participatory guarantees system. CSA = community supported agriculture. NGO = non-governmental organization.
 Sida = Swedish International Development Agency. IICA = Inter-American Institute for Cooperation on Agriculture. SACCO= Savings and Credit Cooperative.
 IMO = International Maritime Organization.

Source: Loconto, A., Poisot, A.S. & Santacoloma, P. 2014. *Sustainable practices, sustainable markets? Institutional innovations in agri-food systems*. Paper presented at SISAZ International Workshop. Paris, France, 21–22 May 2014.

Territorial food value chains for sustainable food systems: initiatives from the French national food programme

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ABSTRACT

The French national policy for food is led by the French Ministry of Agriculture, Agrifood and Forestry and associates 14 other ministries. This public policy is defined operationally in the National Programme for Food (PNA), with four major axes: social justice, food education targeted to youth, the fight against food waste and territorial anchorage. Deployment at territorial levels of the national food policy aims at operationalizing the social, economic and environmental dimensions and objectives, towards sustainable food value chains. This paper focuses on the subnational levels of the PNA and on an innovative disposition called “territorial food projects”, introduced in the law for the future of agriculture, food and forests of 14 October 2014. It briefly describes the objectives and the organization of food public policy at national and subnational (regional) levels: objectives, multistakeholder governance, tools and the role of the state. It then presents a set of initiatives with a territorial approach, showing how they contribute to build sustainable food value chains.

INTRODUCTION

The French food policy is grounded on the recognition of the existence of a French food model, with positive impacts, on the fact that it is increasingly threatened and on the need to address major food-related issues. In 2010 the French gastronomic meal was inscribed on the list of the intangible cultural heritage of humanity by UNESCO. This recognition symbolizes the specific relationship that the French have with meals and food as well as social and cultural values. However, this very relationship is threatened by a growing distance from agriculture for most of the consumers, by the loss of traditional food values and, more generally, by global change. At the same time, major food-related issues, the increase of overweight and obesity, persistent inequalities in food consumption and the importance of the food sector in economic and social terms, as well as its impacts on the environment, call for a strong public food policy.

This paper focuses on an innovative disposition called “territorial food projects”, introduced in the law for the future of agriculture, food and forests of 14 October 2014. It briefly considers some of the major issues to be addressed by a public food policy.

It describes the objectives and the organization of public food policy at national and subnational (regional) levels: objectives, multistakeholder governance, tools and the role of the state. It then describes the notion of “territorial food projects” and presents a set of initiatives with a territorial approach, showing how they contribute to build sustainable food value chains.

CHALLENGES FOR MAJOR FOOD-RELATED ISSUES

The French food model is increasingly threatened by a growing distance from agriculture for most of the consumers, by the loss of traditional food values and, more generally, by global change. There is thus a need to restore the links between food production and consumption and to support the transmission of good dietary practices and food knowledge. This is particularly important as France is becoming increasingly affected by the increase of overweight and obesity even if to a lesser extent than other developed countries and as this resistance has precisely been attributed to the French food model playing a preventive role.

There are also still important food consumption inequalities in France. According to the INCA2 study (AFSSA, 2009), in 2006–2007, 12 percent of French adults were food-insecure. There is an extension of food aid; in 2013, 3.9 million people were users of food banks, at least occasionally. In addition, overweight and obesity prevalence and associated diseases are clearly associated with social inequalities (MAAF, 2014a). A growing challenge is that more and more youth are dropping breakfast (only 57 percent of children between 11 and 14 take breakfast, lowering to 4 percent at the age of entering high school, with a significant gap of eight points between advantaged and disadvantaged families, and of four points between boys and girls (INSEE, 2016)), with consequences on their nutrition and also on the stability of the cultural base that grounds an important part of the French food model.

The food industry is also a major economic sector with more than 16 000 enterprises in food industry alone (MAAF, 2014b) and, along with food services, provides employment to an important part of the population. It has better resisted the decline of employment in productive sectors: losing only 3.4 percent of its jobs between 2000 and 2015, while the industrial sector as a whole has lost 19 percent of its workforce over the same period (ANIA, 2016). This resilience is even more significant for the French economy because the industry is composed of a vast majority (98 percent) of small and medium enterprises, meaning less than 250 employees or sales lower than €50 million/year, spread over the whole national territory. At the same time, as 80 percent of the food produced in France is consumed domestically, a structural excess of production capacities presents challenges for the economic viability of enterprises (ANIA, 2016).

Food consumption also has a major environmental impact. Emblematic of this is food waste, particularly important at retailing and consumption stages.

All of these issues and their importance for the French society call for an integrated public food policy. The emergence of food as central object of public policies also reflects a shift of focus from production to consumption, acknowledging the driving role of consumption and the need to better address consumers’ and society’s concerns and demands.

THE FRENCH NATIONAL FOOD PROGRAMME

In 2010, for the first time, the law defined a public policy on food: “Public policy on food is aimed at ensuring that the general population enjoys access for all, on terms that are financially acceptable, to food that is safe, diversified, sufficient in quantity, satisfactory in terms of taste and nutritional quality and produced under sustainable conditions. It aims to offer to all conditions that make possible a choice of food according to the wishes, constraints and nutritional needs of each individual for his or her wellbeing and good health. Public policy on food is defined by the government in the National Food Programme [...]” (cf. Logifrance, 2016).¹

The law 2014-1170 of 14 October 2014 on the future of agriculture, food and forestry has further integrated sustainable consumption and production objectives and introduced in the Code rural a first article that frames the objectives of the agriculture and food policy. The aim of the agriculture and food policy is to ensure that the population has access to food that is safe, healthy, diversified, of high quality and in appropriate quantity, produced in conditions that are economically and socially acceptable by all, that favours employment, protection of the environment and landscapes, and that contributes to climate change adaptation and mitigation.

The National Food Programme (PNA) determines the objectives of the food policy, taking into account social justice, youth food education and the fight against waste. To ensure that this policy is well grounded in territories it specifies the ways in which local authorities are associated with its implementation. It proposes categories of actions in the education and information areas in order to promote balanced and diversified diets, local and seasonal products as well as nutritional and organoleptic quality of the offer of food, in line with the orientations of the National Nutrition and Health Programme (PNNS).

The PNA promotes the development of short food value chains and geographical proximity between agricultural producers, transformers and consumers. It includes actions to be implemented in order to provide collective catering, public and private, with seasonal products as well as products under a specific quality scheme, notably from organic farming.

The goal of the PNA is therefore to put in place conditions to give each citizen a choice of food in accordance with their wishes, constraints and nutritional needs for their well-being and good health. The policy covers every aspect of food, including nutrition and health, and therefore links to the PNNS. The core of the PNA is founded on partnerships with private-sector actors, local governments and non-profit associations. The government acts as a “facilitator” or a “catalyst” for initiatives by all the partners involved. One of the main goals of the programme is to foster and encourage the emergence on the ground of schemes suited to local needs and above all based on voluntary action by those involved.

The first PNA (2010–2012) covered a wide range of topics, with 85 actions accomplished out of the 86 planned. Following a review process with intense consultations, the PNA was focused in 2014 on four priorities:

- social justice (including access to diverse, quality food by the most vulnerable);
- youth food education;

¹ Article L 230-1 of the code of rural and maritime fisheries law.

- fighting food waste;
- safeguarding local anchoring of food and promoting local heritage.

Public food policy is coordinated at government level by the Ministry of Agriculture, Agrifood and Forestry, in association most notably with the Ministries of Health, Consumerism, Education and Ecology and Sustainable Development, as well as linking up with other ministries such as Justice or Defence, which are particularly important in terms of public catering. At regional² level, the action of the state is organized by a regional food programme, which defines the objectives of the national programme in accordance with regional specificities, associating regional and local elected collectivities and in consultation with regional actors.

TERRITORIAL FOOD PROJECTS

The notion of “territory”, “*territoire*” in French, plays a key role in many French public policies, particularly those that have spatial planning or rural development dimensions. It is in fact a complex notion that can be defined as the association of a space, which can be defined by its physical and geographic characteristics, the way it interacts with human activities, and the actors that manage and represent it (Moine, 2006). Depending on academic disciplines, approaches and purposes, the focus would be more on the spatial, activity or governance dimensions. In fact, actors tend to produce territories around governance (Moine, 2006). Thus territories can have very different scales and defining characteristics, be or not be associated with precise administrative or political boundaries. Actors can define for a territory, pre-existing to the project, a “*projet de territoire*”, to orient its development, for instance (Lardon and Piveteau, 2005; Courlet *et al.*, 2013). On the other hand, a territory can be defined by the project itself, particularly when it is to benefit from public support, such as for European Union-supported projects, such as in the LEADER framework, thus defining a project’s territory, a “*territoire de projet*” (Méasson, 2008; Berriet-Sollicec and Trouvé, 2013).

The law for the future of agriculture, food and forests of 14 October 2014 (integrated in the Code rural) states that the actions meant to address the objectives of the PNA as well as those of the regional plans for sustainable agriculture (PRAD)³ can take the form of territorial food projects. These are meant to bring closer producers, transformers, retailers, local public authorities and consumers and to develop agriculture in the territories as well as to improve the quality of food consumption.

The law (Art. L. 111-2-2.), further defines “territorial food projects”. They are designed in a concerted way with all actors of a territory with the objective of organizing the agricultural economy and of the creation of a territorial food system. They contribute to strengthening territorial food value chains and to developing consumption of products from short value chains, in particular from organic farming.

² In France the region is the highest level of subnational administrative and political organization. Since the reform of 2014 there are 18 regions in France.

³ The law has created, in 2012, the notion of regional sustainable agriculture plans that, for each region, defines the broad orientations of the agricultural and agro-industrial policy in the region, taking into account territorial specificities as well as all economic, social and environmental issues (Article L111-2-1 of the Code rural).

Territorial food projects can be initiated by the state or parastatal bodies, by local public authorities, by groups recognized as “groups of economic and environmental interest”,⁴ by farmers and other territorial actors. They need to comply with the objectives defined by regional sustainable agriculture plans and are formalized by a contract between the various actors engaged in the initiative. They are grounded on a shared diagnosis of agriculture and food consumption in the territory and on the identification of concrete actions to be implemented in order to achieve their objective. They can mobilize public and private financing mechanisms. They can also generate their own funds.

Territorial food projects can be of very diverse nature and scales but share some common characteristics: an initial diagnostic, an inclusive governance and a diversity of possible entry points. The initial shared diagnostic identifies the issues around food in the considered territory as well as the challenges and opportunities in the area. It enables actors to identify issues to be addressed, design a strategy and select actions to be conducted.

INITIAL DIAGNOSTIC: THE EXAMPLE OF MONTPELLIER MÉDITERRANÉE MÉTROPOLE

In August 2014, the newly elected team governing the “Montpellier Méditerranée Métropole” (or 3M) decided to define a public agriculture and food policy, and requested support from research. An Institut national de la recherche agronomique (INRA)-3M joint team was set up in order to assist in defining this policy, driven jointly by the Metropolitan Council and the 31 municipalities it covers (430 000 inhabitants). The scientists carried out a cross-disciplinary diagnosis of the agriculture and food situation in the region, and initiated debates on possible orientations and actions with elected representatives and officers from the metropolitan and municipal services concerned. The different results of their diagnosis were then submitted for debate during stakeholder workshops, which involved around 50 people on two occasions, in order to share perspectives and to formulate proposals for action. Within six months, this partnership generated a preliminary document (Soulard *et al.*, 2015) that was used by the Metropolitan Council to define an “agroecological and food policy”, which was agreed unanimously by the Council on 29 June 2015.⁵

This policy is designed to enhance the sustainability of the food system by targeting five goals:

- to offer healthy, locally-grown foods to as many people as possible;
- to support the economy and employment in the agricultural and agrifood industries;
- to preserve landscape heritage and natural resources;
- to limit greenhouse gas emissions and adapt to climate change;
- to encourage social cohesion.

Seven operational areas are defined; they combine actions intended to promote the coexistence of several agricultural and food systems:

- to consolidate the network of agroecological farms selling directly to consumers;
- to foster local supplies for towns, and particularly for collective catering organizations;

⁴ A “group of economic and environmental interest” is defined by law (L. 315-1) as a group of farmers that are recognized by the state as implementing a pluri-annual collective project to improve their farming system in order to achieve better performance in all economic, social and environmental dimensions.

⁵ <http://www.montpellier3m.fr/vivre-environnement/agro-%C3%A9cologie-alimentation>

- to develop community and family gardens;
- to mobilize citizens around food and the links between producers and consumers;
- to support innovative companies in the agrifood sector and those that provide services to agriculture;
- to promote the diversity of products emblematic of the region, and develop rural/wine tourism;
- to develop a coherent approach towards including agriculture in integrated projects.

INCLUSIVE GOVERNANCE: THE EXAMPLE OF THE NORD-PAS DE CALAIS REGION

In October 2012, the Nord-Pas-de-Calais region elected food governance as one of its major operations of regional development. It was already one of the nine operations of regional development initiated in the framework of the Ecological and Social Transformation of the Nord-Pas-de-Calais region launched in 2010 (IUFN, 2014). The main objective of the food governance operation is to facilitate access to quality food consumption for all. To achieve this objective, it aims to construct a regional food policy that is ambitious and multistakeholder, addressing public health, as well as socio-economic and environmental issues. It will build upon the identification of the expectations and needs of the citizens, coordination of regional actors, both public and private, including farmers, transformers, retailers, educators, health services and streamlining of regional interventions concerning food. The expected result is the emergence of a more sustainable food model that enables access for all to enough food, available in the neighbourhood, economically accessible and of quality (Robillard, 2014).

Between October 2012 and June 2014, as part of this process, the Nord-Pas-de-Calais region organized a broad consultation on food with three complementary steps: consultation of professional actors, a public debate “And tomorrow, what are we going to eat?” and various complementary initiatives (IUFN, 2014). The consultation with professional actors gathered more than 400 people, first by categories to build their own visions of the future, then in a cross-cutting workshop to share perspectives and build mutual understanding. The public debate enabled more 700 people from very diverse origins (farmers, transformers, elected representatives, citizens, non-governmental organizations (NGOs), actors from the health and social sectors) to express their concerns, perspectives and expectations through various means (Région Nord Pas-de-Calais, 2014). The debate was focused on two central questions. One was related to food sovereignty: “Eating products from my region or from elsewhere: do I have the choice?” The other was related to the links between food and health: “Eating well and healthy, is it everyone’s business?” In parallel, several studies were conducted. The resource centre for sustainable development produced guidelines for sustainable food consumption in Nord-Pas-de-Calais to raise awareness of the public. A study on the future of the food system of the region was conducted. A study on the impact of food production on water resources was also conducted with the Ministry of Environment and researchers. Following these consultations, a study was conducted on potential levers towards a future regional food policy (AlimAvenir, 2015).

This process has already produced results. Most stakeholders recognize the legitimacy of the region to initiate and facilitate the process itself. It has enabled stakeholders to share perspectives, progress towards a common understanding of issues and positions and to build new partnerships. It has enabled identification and sharing of good practices and initiatives. Three urban communities have engaged with the region in experimental contracts on the topic of food. Each of these contracts includes an initial diagnostic and the elaboration of an agriculture and food strategy with concrete actions, focused on local food chains, reduction of food waste, protection of agricultural land and creation of green and horticultural belts.

A DIVERSITY OF ENTRY POINTS: THREE EXAMPLES

Initiatives that could be qualified as territorial food projects have very diverse entry points. Most of them could be grouped under three main items: environment, health and nutrition, and local economy, with some additional entries such as urban policies, tourism, etc. Below three of them are outlined, with respectively an environmental entry point, a nutrition and health entry point, and a local development entry point.

The breeder and the bird: beef of our valleys is an initiative that started in the 1980s from an environmental concern – the need to protect the traditional grazing systems of the prairies in the low valleys of Angers, host to the corncrake, or landrail (*Crex crex*), which is considered an endangered species in Europe. Its breeding habitat is grassland, particularly hayfields, where it builds a nest of grass leaves in a hollow in the ground. Modern farming practices often destroy nests before breeding is completed. The protection of the bird thus required protecting its breeding habitat, grasslands, that were threatened by agricultural abandonment and poplar plantations and maintaining either grazing or late haymaking to avoid destruction of youngsters. These objectives have been pursued through several multistakeholder measures, involving farmers, hunters, environmental NGOs and public authorities (Billaudeau and Thureau, 2010). The area was classified in 1984 by the state as an area of interest for ecology, flora and fauna (ZNIEFF: Zone naturelle d'intérêt écologique, faunistique et floristique [Natural zone of ecological interest, fauna and flora]). All the actors gathered to design a collective initiative (Opération groupée d'aménagement foncier - OGAF) under which were established individual contracts with farmers to maintain the land as grassland and to conduct practices favourable to birds, in particular to the corncrake. The farmers involved organized themselves in an NGO that developed a specific brand, The breeder and the bird: beef of our valleys, to commercialize the beef produced according to bird-friendly practices. This benefited from using a certification developed for the commercialization of grass-fed beef by the inter-professional organization that is focusing on quality and safety and to which were added bird-friendly production standards.

The *Qualinut'Prod* initiative is the result of increasing concern about overweight and obesity in Martinique. Martinique is an overseas insular region of France located in the Lesser Antilles in the eastern Caribbean Sea. Fifty-one percent of its population is overweight or obese and it has a high consumption of sugar that WHO recommends to reduce. Since 2012, public authorities and agro-industry are collaborating to measure the sugar content of industrial foods, including sodas, dairy products, ice creams, cookies and

cakes produced in Martinique and to compare them with analogous products from the mainland. Initial studies showed that, on average, products produced in Martinique had a higher sugar content (up to 46 percent for yoghurts) than the same product produced in mainland France. These results led to agreements between the food industry and the state to reduce the sugar content of the products produced and sold in Martinique to align them to those produced and sold on the mainland, with already some first concrete progress covering nine brands and 18 references.

The *Figeac lands: a tasty mix* initiative was the result of a reflection on the development of rural territories, with three driving convictions. First, territories are an appropriate scale to support development, particularly endogenous development. Second, to be dynamic, territories cannot only be supported by external financing; their actors need to generate activities and productive functions. Third, de-compartmentalization of vertical approaches (such as the ones generated by craft/trade approaches) towards territorial approaches (horizontal) is a factor of development (Interval, 2015). The initiative gathers around the vision of a territorial food policy with seven categories of actors: producers, civil society, consumers, catering, restaurants, the small food industry and retailing. It is grounded on a governance associating these seven categories and materialized with a collective sign of recognition: the logo *Figeac lands: a tasty mix*. Its objectives are to: improve food knowledge and competencies, valorize local products and know-how, support social innovation and promote territorial specificities and qualities. The initiative conducts several types of activities, among which the organization of food events, support to the establishment of farmers, support to projects for collective catering and the realization of a basket of local products, branded *Figeac lands: a tasty mix*.

Beyond these three examples, and to feed a national reflection to build an official recognition scheme (with minimal criteria) for the territorial food projects (PAT) as defined by the law, the French Ministry of Agriculture, Agrifood and Forestry has launched a public enquiry towards the owners of such projects throughout the national territory (MAAF, 2016). At the closure of enquiry, more than 93 projects were registered. The results of the enquiry will soon be available and will ground the recognition scheme that the Ministry aims to finalize, in consultation with all national stakeholders, before the end of 2016. This scheme will be accompanied by a methodological support toolkit for the development of new PATs, and the establishment of a national network. The Prime Minister of France has set a target of reaching 500 PATs for 2020 (Comité interministériel aux ruralités, 2016).

CONCLUSIONS

There are real opportunities for the development of food policies in France in support of sustainability goals. Local food initiatives can play a key role in their implementation. The PNA needs to evolve to better support these local initiatives. There are, however, challenges in linking global and local, vertical and horizontal. It requires constructing global approaches all along the food value chain. It also requires harmonizing, or at least making compatible, the objectives of very different sectoral policies: food, health, agriculture, to name just a few. For instance, there is a need for clear objectives around the links between food and health. This calls for designing appropriate methodologies for

territorial food approaches. It also questions the role of the state and its capacity to support a multiplication of initiatives with limited resources. Finally, an essential question is how local initiatives can have the broadest possible impact on populations. How they can impact the whole system? How can action on local food chains also act on the global food system?

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The new Nordic diet as a prototype for regional sustainable diets

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ABSTRACT

A main challenge in sustainable food systems is to link sustainable production to sustainable diets and consumption patterns. The new Nordic diet (NND) builds on and shares the Mediterranean diet (MD) thinking, but utilizes the ingredients and flavours of a northern climate. In both diets, variation in produce, organic, local production and seasonality are essential, all of which contribute to the preservation of the local landscape and sea, as well as to the health of the consumers. The agricultural biodiversity plays a huge role and provides a variety of plant and animal food products from both wild and domesticated sources. Both diets have been associated with health benefits. The NND is a prototype regional diet taking health, food culture, palatability and the environment into account. Thus, the principles and guidelines could be applied in any region of the world. There are currently activities for initiating, modeling and assessing these transformation processes.

INTRODUCTION

The Western dietary pattern has been shown to be unsustainable in terms of both health and environmental impact (Tilman and Clark, 2014). The prevalence of life-style related diseases has increased dramatically over the last 60 years (Bendixen *et al.*, 2004; Pearson *et al.*, 2005). Obesity alone has doubled since the 1980, and, in 2014, 39 percent of all adults above 18 years were affected by overweight or obesity (WHO, 2016).

Obesity increases the risk of a wide range of serious medical complications, including cardiovascular disease, insulin resistance, type 2 diabetes, gallbladder disease, osteoarthritis, asthma and several cancers (Haslam and James, 2005). Promoting a healthy diet is therefore an important aspect of public health policies in many countries, and the recommendations for healthy eating are very similar across countries (Brug and Oenema, 2006). Overconsumption and waste are also associated with unsustainable environmental impact, such as expansion of agricultural land and emission of greenhouse gases (Wheeler and von Braun, 2013; WHO, 2012; UNEP, 2012). Several authors have identified sustainable diets as an important

future challenge for a healthier, more sustainable and environmentally friendly future (Springmann *et al.*, 2016; FAO/Bioversity, 2010; Macdiarmid *et al.*, 2012; Burlingame and Dernini, 2011).

MEDITERRANEAN DIET AND NEW NORDIC DIET

The traditional Mediterranean diet (MD) has been highlighted as an example of a healthy, culturally embedded and sustainable diet and was recognized as an Intangible Cultural Heritage of Humanity by UNESCO in 2010 (UNESCO, undated). However, the MD seems to be culturally far from the Nordic culture and probably also from the culture of many other countries and regions. Recent studies showing the adherence to the MD in many European countries from 1960 to 2000 show that among the countries least likely to follow the MD dietary pattern are Finland, Norway, Iceland, Sweden and Denmark (Trichopoulou *et al.*, 2005).

In 2003, the New Nordic Cuisine Manifesto was formulated by a group of Nordic chefs at a meeting in Copenhagen (Välimäki *et al.*, 2014) and two years later it was adopted by the Nordic Council of Ministers as the ideology of the New Nordic Food Programme (Nordic Council of Ministers, 2005). The aim was to establish a Nordic cuisine as part of the gourmet world map. Since then restaurants and chefs, focusing on Nordic food, have been rated among the best in the world (Bocuse D'Or, 2015), showing that foods from the Nordic region clearly have great gastronomic potential. Furthermore, a number of scientific studies have been performed that have demonstrated that the new Nordic diet (NND) also has health beneficial effects that seem to be in line with the beneficial health effects of the MD (Adamsson *et al.*, 2011, 2014; Lankinen *et al.*, 2016; Poulsen *et al.*, 2014; Uusitupa *et al.*, 2013). This is not very surprising as the NND and the MD share many similarities; they both call for: more vegetables, fruit, whole grains, fish and non-animal protein; moderate consumption of

low-fat dairy, less meat and sweets; and avoidance of processed food. So the NND shares the Mediterranean thinking, but utilizes ingredients and flavours from a Northern climate (Mithril *et al.*, 2012).

Key principles for the NND are that the food is of Nordic identity, sustainable, of high gastronomic quality and healthy (Figure 1). The dietary guidelines following these four key principles are given in Table 1. The idea is that the food should be produced locally and be from organic production. More calories should be from plant food and less from animal food. Food of



Figure 1. FAO sustainability frameworks and approaches
Source: FAO (2014).

Table 1: The new Nordic diet – general guidelines

1. More fruits and vegetables (a lot more berries, cabbage, root vegetables, pulses, potatoes and fresh herbs)
2. More food from the wild landscapes
3. More whole grains – especially oats, rye and barley
4. More food from the oceans and lakes
5. Meat of a higher quality, but less
6. Choose organic whenever you can
7. More meals closer to nature
8. Throw less away

Source: Mithril *et al.* (2012).

high quality, which exists in abundance in the wild and with high biodiversity, should be included in higher amounts.

HEALTH BENEFICIAL EFFECTS OF NEW NORDIC DIET

As the Nordic countries are different also in relation to local food, these guidelines can be translated into national guidelines and for Denmark, specific guidelines have been identified. Several scientific studies have demonstrated that the NND displays some health benefits on some of the health risk markers, in line with the MD, among these are the Sysdiet, Nordiet, Sydimet and OPUS studies (Adamsson *et al.*, 2011; Poulsen *et al.*, 2014; Uusitupa *et al.*, 2013; de Mello *et al.*, 2011).

The Sysdiet study was a randomized controlled multicentre study performed in six centres in four countries (Finland, Sweden, Iceland and Denmark) comparing the effect of a healthy Nordic diet and an isocaloric control diet (18–24 weeks) on insulin sensitivity, lipid profile, blood pressure and inflammatory markers. The study participants had features of metabolic syndrome (approx. 90 percent) (166 completers, mean age 55 years, BMI 32 kg m², 67 percent women). The study observed decreases in non- high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL)-C/HDL-C ratio, apolipoprotein (apo) B/apo A1 ratio and IL-1 Ra¹ in subjects consuming the healthy Nordic diet compared to subjects consuming the control diet (Uusitupa *et al.*, 2013).

The Sydimet study was a randomized controlled study performed in Finland comparing the effects of a healthy Nordic diet (high in fatty fish, bilberries and whole grains); a whole-grain-enriched diet and a control diet on plasma inflammatory markers in volunteers with impaired glucose metabolism and features of metabolic syndrome (104 completers, mean age 59 years, BMI 31 kg m²; 51 percent women). The study observed decreases in plasma E-selectin in the healthy diet group only and decrease in high sensitivity C- reactive protein (hsCRP) in the healthy diet group and the whole-grain-enriched diet group in individuals not receiving statins (de Mello *et al.*, 2011).

The Nordiet study was a randomized controlled study performed in Sweden comparing the effects of a healthy Nordic diet (rich in plant foods, fruits, berries, vegetables, whole grains, rapeseed oil, nuts, fish and low-fat milk products, but low in salt, added sugars and saturated fats) with a control diet (usual Swedish diet) (six weeks) on LDL-cholesterol, blood pressure

¹ IL-1 Ra – member of the interleukin 1 cytokine family.

and insulin sensitivity in mildly hypercholesterolemic subjects (86 completers, mean age 53 years, BMI 26 kg m², 63 percent women). The study observed decreases in total, LDL and HDL cholesterol, in LDL-C/HDL-C ratio and in apo B/apo A1 ratio as well as in systolic blood pressure in the healthy Nordic diet group compared with the control diet group. Furthermore, despite an ad libitum diet, the healthy Nordic diet group also decreased their bodyweight. After adjustment for bodyweight, the significant differences between groups remained for blood lipids, but not for insulin sensitivity and blood pressure (Adamsson *et al.*, 2011).

In the OPUS study the health effects of the NND were compared with the average Danish diet in a free-living but highly-controlled setting in adult subjects with increased risk of metabolic syndrome (147 completers, mean age 42 years, BMI 30 kg m², women 71 percent). The aim of the study was to test whether the NND could be a healthy and attractive alternative to the MD or the DASH (dietary approaches to stop hypertension) diet and easily adopted. The study observed a high compliance to the diet, as well as significant weight reduction and reduction in both systolic and diastolic blood pressure in the subjects receiving the NND compared with the subjects receiving the average Danish diet (Poulsen *et al.*, 2014).

In conclusion, the health potential of the NND is considerable and the diet is well accepted by the participants, which supports the potential of the NND as an alternative to other regional diets, such as the MD.

ENVIRONMENTAL IMPACTS OF NEW NORDIC DIET

The environmental impacts of the NND and of the average Danish diet (ADD) were analysed and compared based on 16 impact categories (Saxe, 2014). When both diet and transport were taken into account, the NND reduced the environmental impact relative to ADD measured by all 16 impact categories. When the content of organic produce was also taken into account, the NND reduced the environmental impact compared with the ADD measures by only 10 of the 16 impact categories, whereas six were increased. So reducing the intake of meat to 35 percent less meat, increasing whole grain products, nuts, fruit and vegetables and excluding most long-distance imports, substantially lowered the environmental impact compared with ADD. Inclusion of organic products into the NND was more advantageous for the environment than the ADD, but less advantageous than the non-organic NND. In some instances organic produce is environmentally inferior to conventional produce and in some cases it is superior. Saxe (2014) concluded that one of the benefits of choosing organic is the long-term effects of excluding pesticides and chemical fertilizers and preserving soil structure, while a disadvantage of choosing organic products, in a Danish context, is the smaller yields and thereby potential for increased land use. These results therefore seem valid in short-term perspectives and for industrialized countries. In developing countries, organic agriculture can improve the present yield and in the long-term perspective it may be the only alternative to a more sustainable approach.

DIET FOR A CLEAN BALTIC

In parallel to the NND the “diet for a clean Baltic” (BERAS Implementation, 2016) has been developed in the Baltic Sea region coming from the special focus on regenerative

agriculture, to reduce the eutrophication of the Baltic Sea (Granstedt *et al.*, 2008). This dietary concept focuses more on the link between food consumption and farming practices rather than on health impact and calculates the global warming potential of the diet. Positive effects on sustainability issues have been documented (Larsson, Granstedt and Thomsson, 2012). The principles of the diet for a clean Baltic have also been tested out in cities in Poland, Lithuania and Spain (EU URBACT, undated). The concept is thus prepared to be spread to other regions in the world.

NEW NORDIC DIET AND THE LOWLAND DIET

Recently, NND recommendations have been transferred to a region in the Netherlands (van Dooren and Aiking, 2014). The authors calculated sustainability and health impact by self-developed scores. Each score consists of different indicators: the health score consists of ten nutritional characteristics, the sustainability score of greenhouse gas emissions and land use. The impact of NND recommended and quantified grams of product per day (Mithril *et al.*, 2012) were compared with those from the average Dutch diet and the MD, as well as a historical lowland and an optimized lowland diet (LLD). The optimization was done by linear programming but for the historical LLD only. Consequently the optimized LLD showed markedly less impact on greenhouse gas emissions and land use compared with NND. Nevertheless, NND showed the highest score for the health impact, when all different diets were compared. Further approaches, transferring the NND concept to other regions in the world, may therefore focus on transferring principles and guidelines and adopt them to the traditional local diets, when recommendations will be set up in terms of grams or percent energy intake per day. Furthermore, the identification of criteria plays a crucial role in evaluation, monitoring and benchmarking these transformation processes (Auestad and Fulgoni, 2015).

POLITICAL SUPPORT

The NND has gained strong political support by the Nordic Council of Ministers. In 2005, the chefs behind the New Nordic Cuisine Manifesto passed the baton to the Nordic Council of Ministers, which put new Nordic food on the political agenda. The Nordic Council of Ministers for Fisheries and Aquaculture, Agriculture, Food and Forestry adopted a venture that aimed at developing the concept of new Nordic food into a lifestyle that will be better for nature, for people and for the Nordic society as a whole. This was developed through the two programmes New Nordic Food 1 + 2, and will now be carried on into New Nordic Food 3 (Nordic Council of Ministers, 2012).

So far the programme initiated by the Nordic Council of Ministers seems to be successful and overall the NND has been shown to be healthier than average Nordic diets and can be used to promote the Nordic region as a green and clean region, which may also attract sustainable food tourism.

CONCLUSIONS

Westernization of our diets is linked to most life-style diseases; therefore scientists have recommended translation of dietary recommendations into more healthy and sustainable diets (Bere and Brug, 2009). In the Mediterranean area, the erosion of the traditional

MD pattern in all countries around the Sea has made a group of scientists elaborate new recommendations (including a pyramid) for implementing the MD for today's people accounting both for cultural traits, healthy nutrition and environmental aspects (Sáez-Almendros *et al.*, 2013). Attempts to put this recommendation into practical application in some regions are on going. In the Nordic region, chefs, scientists, politicians and public movements have, together and in parallel, been successful in defining a NND, not by introducing new food items, but by reintroducing and redefining food items already growing or living in the Nordic region.

The NND is a prototype regional diet taking health, food culture, palatability and the environment into account. It has been successfully tested in some regions in Northern Europe and firstly transferred to a region in the Netherlands. There is a great potential in transferring NND to any region in the world by applying its principles and guidelines to transformation of local, traditional dietary patterns to be more healthy and sustainable.

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FAO's approach to gender-sensitive and sustainable food value chains

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ABSTRACT

Over the last decade, the value chain has established itself as one of the main paradigms in development thinking and practice (FAO, 2014). In a rapidly changing and globalizing agricultural sector, developing sustainable agrofood value chains can offer important pathways out of poverty. Although women play a fundamental role in agriculture and in agrofood value chains, they also face specific constraints in participating and benefiting equally from their development. Nonetheless, value chain interventions typically do not include a gender perspective and therefore fail to provide women with equal opportunities of economic empowerment.

This paper argues that a gender-sensitive approach to value chain development can not only foster women's empowerment and greater gender equality, but also contribute to more efficient and sustainable value chains. It presents FAO's gender and value chain conceptual framework. By combining the social and economic sustainability objectives of value chain development, the framework aims at guaranteeing an equal distribution of benefits and costs along actors, both male and female, in the value chain. Concepts from the classical value chain approach and from the women's economic empowerment approach are illustrated, and form the theoretical basis of the gender-sensitive approach. This is translated into practical guidance for practitioners, where gender-sensitive value chain mapping, the household and individual level and the identification of gender-based constraints form the building blocks of FAO's approach. The application of the framework allows the identification of value chain inefficiencies as well as of the specific challenges faced by men and women that would be overlooked without adopting a gender-lens. This is illustrated with a case study from the cassava value chain in the Côte d'Ivoire.

INTRODUCTION

In the past years, trade liberalization, globalization, modernization and other global trends have brought important changes in agricultural and food systems. In fact, due to this evolution, the agriculture sector becomes one part of an integrated value chain, and cannot be seen as an isolated sector in which to operate. While liberalization and globalization have certainly yielded positive results and created new opportunities, opening up new markets

and creating new successful linkages between producers and markets, it has at the same time created challenges and barriers for smallholder producers to participate equally in these local, national and global markets (FAO, 2013). The interconnected global system bears the risk of further marginalization of the poor and vulnerable, and rural women in particular. Global value chains come together with high product and processing standards, which are difficult for the poor to fulfill, because of lack of assets and information (FAO, 2014). Poor women face additional barriers that further limit their ability to adapt to and benefit from change (FAO, 2011a). Therefore, the need exists to pay specific attention to the *social sustainability* of value chain development and, in particular, to adopt a gender-sensitive approach that can inform policy-makers and development practitioners about the specific needs and constraints faced by women and men.

FAO's approach to gender-sensitive value chain development takes into account the factors that influence the equal distribution of value-added along the value chain. The characteristics of individuals (sex, age, ethnicity, etc.) and the manner in which individuals and specific groups of people interact in a certain socio-cultural setting determine how different people can participate in and benefit from a value chain. Putting a human face to value chain development greatly enhances inclusive value chain development. More specifically, addressing gender inequalities in value chains will ensure that both men and women can benefit from value chain participation and upgrading strategies.

FAO's Gender and Value Chains Framework thus unites the social and economic sustainability objectives of value chain development in the agriculture sector, but does not ignore the environmental aspects that are also part of a sustainable value chain. It builds further upon, and wants to be a valuable integration, of the framework presented in FAO's *Developing sustainable food value chains. Guiding principles* (2014), by offering the principles, guidance and practical tools to go about gender-sensitive value chain development.

COMBINING ECONOMIC AND GENDER EQUALITY OBJECTIVES: THEORY AND BASIC CONCEPTS

Economic viability, the market system and systemic change

Markets are dynamic and therefore flexibility and continuous improvement of strategies are needed. A premise of the value chain approach is that the actors of a chain work together to be competitive and access markets. The value chain is anchored in a *market-driven system*, meaning that it is the market demand that pulls the value chain. In fact, the economic viability of a value chain depends on the market: if there is no market for a product, the value chain will not function. An essential element of this approach therefore remains identifying the underlying causes of market failure, in order to formulate sustainable change. Sustainable and scalable change is best achieved through interventions that involve the existing value chain actors and local service providers (public or private) who can eventually continue to facilitate change after a programme or project has ended, and as part of their core business. Rather than fighting symptoms, a sustainable value chain development approach addresses root causes by looking at incentives for actors to carry out necessary activities or services within the chain. As a value chain does not operate in isolation but is part of a system, solutions for underperformance may lie somewhere

else in the system, and not necessarily in the core chain (FAO, 2014). This is why it is fundamental to endeavour towards *systemic change*, defined as “change in systems, such as markets, government, or civil society, caused by introducing alternative, innovative business practices” (DCED, 2015).

The relationships between and the organization of actors – also referred to as *governance* – are central to the functioning of the chain. The way in which the various nodes in the value chain are connected and function (through rules, regulations, customs or traditions) governs the value chain and influences the capacities and incentives for behaviour of the different actors. These capacities, incentives and constraints of the actors are very different for women and men, and need to be assessed in order to formulate effective value chain interventions. Without a robust gender analysis, value chain interventions risk being ineffective, or even damaging (FAO, 2011b).

Women's economic empowerment as a strategy for value chain upgrading: access, power and agency

Women's limited access to the resources and opportunities they need to participate and benefit equally from value chains may, in some cases, be the reason why value chains are underperforming. When value chain inefficiencies can be connected to gender-based constraints, women's economic empowerment is a successful strategy to upgrade the value chain in an effective, sustainable and inclusive manner.

In the context of agricultural value chain development, FAO's conceptual framework considers women's economic empowerment as consisting of:

- i. access to productive resources, and
- ii. power and agency.

The gender gap in access to resources in the agriculture sector has been broadly documented, elucidating how this hampers women to realize their full agricultural productive potential (FAO, 2011a). Guaranteeing access to resources is a substantial component of women's economic empowerment, and can be further detailed into three specific areas:

- i. Access to assets

Land is a fundamental asset for households depending on agriculture. Gender inequalities in access and control over land persist across all regions.

Access to **equipment and machinery** means having the opportunity to increase the quantity, quality and efficiency of agricultural production. A large gender gap exists in the access and control over equipment between men and women.

Networks and social capital are fundamental assets, being a means for increasing access to markets, resources and opportunities. Women's social capital is often smaller and of more informal character than men's, mainly including kin, friends and neighbours, while male networks include co-workers and formal business relationships.

- ii. Access to agricultural services

Agricultural extension services (granting access to quality seed varieties and modern cultivation techniques) are important to increase agricultural yields. Women tend to have far less access to agricultural services than men.

First, the bias towards male farmers or processors in training activities and information dissemination is based on the flawed perception that farmers and entrepreneurs are mainly, if not solely, men – and not women. Services tend to be designed for men, failing to consider women’s constraints to participate in them (due to mobility constraints, care-work and related time poverty, lower educational levels, etc.) Second, it is often assumed that husbands will transmit the knowledge and know-how they acquire by informing their wives, which is also not necessarily true.

Access to new technology is important for continuous improvements in productivity, food loss reduction and efficiency. Gender gaps exist in access to a whole range of agricultural technologies, due to cultural norms, women’s time constraints, educational background and vulnerability to (and thus reluctance to take) risks.

iii. Access to financial and social services

In order to upgrade a value chain, working **capital** is often required. Women generally have less access to **financial services** than men, regardless of the node of the value chain in which they operate. Often women do not own land or houses, which are needed for collateral. Sometimes there are other conditions that prevent women from opening a bank account or taking out a loan, such as the requirement of a male co-signer.

These productive resources are fundamental conditions for growth in the agriculture sector. As discussed, it is in these areas that the main gender gaps can be found. Assessing and analysing the causes for these gender gaps is a necessary step to formulating adequate solutions. However, access to productive resources is not enough for women to increase their production and their position in society. Women also need decision-making power, fundamental in making use of the economic opportunities that present themselves. Women deserve, just like men, to freely make use of the ability to make autonomous choices, and transform those choices into desired outcomes. We speak here of **power** and **agency**.

Power and agency are equally important components of empowerment. Power and agency “enable rural women to benefit from economic and social activities through their ability to make decisions and act upon them and by exercising control over their resources and returns” (FAO, 2015).

In the context of value chain development, power and agency can be further articulated in the following elements that mainly play at the individual level:

i. Capabilities

Capabilities refer to the level of knowledge, skills and experiences an individual possesses. Often women have fewer capabilities relevant to participating and gaining from value chains.

ii. Self-confidence

In a society where gender-roles are quite strict, women are often confronted with very explicit rules on what they can and cannot do. For instance, women are not considered to be entrepreneurs, women are not supposed to speak up or express their opinions, women should mainly spend their time at home, and so on. These social constructions have an impact on women’s self-confidence. They are

embedded in society, and not easy to overcome. It is however of key importance to address these aspects of power and agency in the design of an intervention, and design interventions in a way that encourage women to build self-confidence, while involving and sensitizing men.

iii. Decision-making power

Decision-making power is fundamental in many aspects of value chain development. Decisions are made regarding the type of crops, the kind of business to develop, what markets to target, what kind of job one wants to pursue and so on. In addition, decisions related to how to invest **time** are of key importance, and most women do not have the power to decide about what to do with their time. They are bound to carry out time-consuming household chores, limiting their ability to spend time on productive activities.

Working towards shared decision-making processes in the household is important to make sure men and women decide together on how to use household income, allowing women and men to benefit equally from that income.

The three aspects of capabilities, self-confidence and decision-making power are closely interrelated, and should therefore all be addressed, in an effort to create a virtuous cycle: more capabilities can lead to more self-confidence and – possibly – to more decision-making power.

Practical guidance for gender-sensitive value chain development

The main objective of FAO's approach to gender-sensitive value chain development is to promote gender awareness and to contribute to the design and implementation of a gender-sensitive value chain development. Therefore, the theoretical basis of the approach is complemented by implementation guidelines that operationalize the concepts that have been previously discussed.

Gender-sensitive value chain selection

The selection of the value chain is an important first step, and should be based on a sound **gender-sensitive context analysis**. It is important to identify a sector and a value chain that have the potential to create a significant impact on both women and men. Information on market opportunities and the barriers women and men experience needs to inform the selection. Essentially, the choice of the targeted value chain depends on:

- the value chain's potential for growth, as well as its importance for a country's economy;
- the value chain's potential for increased women's empowerment and gender equality;
- programme- or project-related criteria, such as fund availability, donor/government preferences or priorities.

An important decision relates to the choice to focus on a **female-dominated**, or on a **male-dominated** chain.

- Female-dominated value chains are chains in which women are the main actors at production (and sometimes at processing and marketing) level. For example, chains within the dairy, poultry and shea subsector.

- Male-dominated value chains are chains in which men are the main actors and women play a less prominent role. Frequently, women provide unpaid and invisible labour. These chains are oftentimes cash crops, for example, chains within the coffee subsector.

Selecting female-dominated chains can be a good strategy in countries and contexts where gender equality remains a culturally sensitive topic. Here, the intervention can be oriented towards professionalizing women's work, for example by upgrading products to safety or quality standards. Supporting linkages, networks and access to markets, through female producer organizations can also be a strategy. Working on female-dominated chains does not mean that gender equality targets will be met without addressing gender-based constraints. On the contrary, underlying power structures and inequalities still need to be assessed, and both aspects of women's empowerment (access to productive resources and power and agency) should be tackled.

Focusing gender-sensitive value chain interventions on male-dominated chains might seem particularly difficult. However, much can be gained from making women's labour visible and working towards its full recognition. This offers promising opportunities for gender-transformative change. It is important to involve men and influencers in the society/community in this process to create broad support and buy-in.

Making women's work visible: gender-sensitive value chain mapping

Women are profoundly involved in value chains, taking on multiple roles as producers, processors, entrepreneurs and retailers. They are active as wage or own-account workers. However, women's contributions often remain invisible, or are considered as being merely auxiliary. At the production level, for example, it is assumed that producers are male, hiding women's contributions as partners in the family business.

The issue of (non-)visibility of women's contribution to agrofood value chains has broad implications and consequences, also on the policy-level. When data and statistics are unavailable, this fails to document and draw a clear picture of the magnitude of the problem and policy-makers will not be adequately informed. Consequently, a solid evidence base on which policies are built is missing, and policies risk being shaped in a gender-blind way.

Gender-sensitive mapping is about visualizing and recognizing the role of both women and men. It is about rightfully displaying the work women do, their focus on quality and hygiene, their skills for good administration and their domestic work that enables productive work of others. In this way, women will start to reconsider their "help" as an important contribution to the value chain development. "Help" becomes "work", and this is important in the process of empowerment: women (and men) get new insights about their lives and their contribution. This is a necessary step in the process of negotiating new gender power relationships in their households and with other actors in their value chain.

Gender-sensitive value chain mapping follows the regular value chain analysis method: analysing each node of the chain and the relationships between the actors in and between the nodes. In every step, gender-disaggregated data need to be collected on:

- i. participation in the chain and the degree of *dignity* and *value*¹ of this participation;
- ii. access to and control over productive resources;
- iii. access to and control over benefits.

Gender-sensitive mapping is a visual exercise. A useful tool for gender-sensitive mapping developed by Agri-ProFocus (2012) illustrates the five key steps that need to be undertaken.

Looking beyond the chain: the household and individual level

To ensure equal access to and control over benefits it is important to take the household level into account in the analysis. Conventional value chain development often stops at the household level, assuming that all members benefit equally. In reality, however, households are heterogeneous entities, shaped by the same power structures and patterns as society at large.

Within a value chain development approach there is often not enough room for gender-specific systemic constraints faced by poor women and men (Jones, 2012). For a sustainable value chain approach to be gender-sensitive, it should include some essential elements of the women's economic empowerment framework:

- i. the individual level (lack of self-confidence, skills, men–women power relationships); especially for women this is a very important level to include, as many gender-based constraints relate to this level;
- ii. the **workload** of women, including household and community work and how this influences their ability to be involved in production and paid labour (Jones, 2012).

Both the *power* and *agency* aspects of gender equality play at the household level, not only impeding women from benefiting from, but also to participate in, economic activities. This can have an impact on the efficiency of the value chain. For example, if a woman is constrained to participate in training to increase her skills, this can negatively affect the quality of production or processing. Thus, the individual level also affects the performance of the value chain.

Identifying and analysing gender-based constraints

Gender-based constraints refer to restrictions on men's or women's access to resources or opportunities that are based on their gender roles or responsibilities. The term encompasses both the measurable inequalities that are revealed by sex-disaggregated data collection and gender analysis as well as the processes that contribute to a specific condition of gender inequality (USAID, 2009).

Gender inequalities in access to assets, productive resources, knowledge, extension services and innovation are factors that affect the way in which men and women participate and gain in value chains. Women tend to have fewer opportunities than men in the value

¹ Dignity and value concern the respect and value of women's contribution deriving from work they are doing. It concerns both the labour conditions (how women are treated) but also the intrinsic value of work: the value of the work for the individual carrying out the work. This last point is important because it also relates to self-esteem and building up voice within the household, community and society (based on FAO, 2015). by Monika Percic, Decent work as a key driver for sustained empowerment of rural women, a conceptual paper.

chain, in terms of employment, training and business development. The many constraints that women face influence their economic potential, which in turn negatively affects the performance and efficiency of the whole value chain by jeopardizing the volume and quality of the produce. Also, a lack of mobility of women and thus a lack of access to markets, as well as social norms, impede their interaction with other value chain actors, hindering the flow of products and services.

Identifying and analysing gender-based constraints is therefore important. It enables the development practitioner to understand the underlying causes of constraints in a value chain, which in turns allows for the design of interventions that bring about systemic change. Understanding why women's and men's participation in the value chain differ is essential to develop actions to address identified obstacles and to contribute to a successful value chain upgrading intervention. Finally, addressing gender-based constraints leads to better functioning value chains from which women and men benefit equally, and prevents negative impact on women of the value chain upgrading process.

When identifying gender-based constraints, three basic questions are to be asked (USAID, 2009):

- i. Who is being affected (who)?
- ii. What is the observed inequality (what)?
- iii. What are the causes of that limitation (why)?

USAID (2009), as well as Agri-ProFocus (2012), have developed tools that allow for a systematic, step-by-step identification of gender-based constraints. The process starts with the identification and mapping of the value chain, and the description of the roles and responsibilities by gender (see section above: *Making women's work visible*). Then, who has access and control over the resources needed in these roles is identified, and who is being affected and what kind of observed and measurable inequality(-ies) exist. In a final step, the causes or factors leading to the gender-based constraint are delineated. Often, causes are to be found in the division of labour between men and women, access to and control over resources, beliefs and perceptions, laws, policies and institutions.

Monitoring and evaluation

Monitoring during project implementation serves to track to what extent the activities are carried out according to plan. Evaluation is important to assess to what extent project objectives are attained and the impact of the interventions. The monitoring and evaluation system is crucial to ensure whether interventions follow the right path. Clear gender and value chains indicators should be defined in the project design phase. In many programmes, indicators are quantitative, e.g. the number of farmers that received a loan from a micro-finance institution. These can relatively easily be gender-disaggregated. Often these quantitative indicators can be linked to the "access to productive resources" dimension of women's economic empowerment. Besides quantitative indicators, qualitative indicators are needed to capture gender transformative and systemic change. These often relate to the "power and agency" dimension of women's economic empowerment, e.g. do women feel more secure in a sector's association to express their opinion?

Choosing the right indicators is crucial to ensure that interventions are carried out properly and can safely be linked to the impact for which they were designed.

EXAMPLE FROM THE FIELDS: A GENDER-SENSITIVE ANALYSIS OF THE CASSAVA VALUE CHAIN IN CÔTE D'IVOIRE

In the context of FAO's Multipartner Programme Support Mechanism (FMM), *Enabling women to benefit more equally from agri-food value chains*, FAO's approach to gender-sensitive value chain development was piloted in Côte d'Ivoire in the cassava value chain.

The cassava value chain is almost exclusively managed by women, from production, through processing until commercialization. Through the processing phase, where cassava is transformed into attiéké,² women manage to capture a large share of the added value. The revenue they make through these activities is used for their households, or for community funds in the context of producer's groups or cooperatives. Cassava is an important crop, and can be considered as a safety capital similar to livestock. Thanks to the possibility of keeping the cassava tubers stored in the ground, households have a stockpile they can access in times of scarcity or specific occasions, thus reducing their economic vulnerability.

Around 90 percent of the processed cassava is processed by women. Processing cassava into *attiéké* is a long and laborious process that includes various stages and takes multiple days. After being transported from the fields to the processing units, the tubers are peeled, cut into chips, cleaned and crushed with a specific ferment prepared for the purpose. The resulting paste is left to ferment overnight. Then, the resulting paste is pressed and spread on large trays to dry in the sun for 20 to 30 minutes. Traditionally, the dried paste is then made into semolina, beating the paste by hand through a sieve. Small, more modern processing units use a machine for this phase. Subsequently, the product is steamed for an hour and put into bags of 700 to 900 g, destined for wholesale. The fresh *attiéke* then needs to be transported quite rapidly to the wholesale market, to be sold on the markets.

Thanks to the gender-sensitive analysis of the value chain, a number of gender-based constraints were identified.

For instance, given the fact that women need to take care of the household chores and child-care, as well as other agricultural activities related to the cultivation of food crops near the house, women manage to prepare *attiéké* only once a week. The processing phase is rarely mechanized and coordinated. Furthermore, during this phase (the peeling and cutting of the cassava tubers), women are simultaneously taking care of their younger children. This considerably diminishes their productivity, and has an impact on the efficiency of the chain. The underlying cause of this constraint is the fact that women carry a very heavy work burden. While they might have a say on the cassava production and processing, they have little control on their time allocation to household work and the other productive activities. Women still carry the main responsibility for food and nutrition security for

² *Attiéké* is a fermented and gelatinized cassava meal that has its origins in the south of Côte d'Ivoire, but which is now the most popular cassava product in the country. *Attiéké* is generally consumed with meat, incorporated into a vegetable sauce or mixed with milk.

their households; this includes the cultivation of food crops and the daily preparation of meals. Moreover, the work burden of women involved in the cassava value chain is further increased by the support they need to provide to the harvesting of the cash crops their husbands cultivate (cashew nuts, for example).

These constraints have an important impact on the cassava value chain. For instance, women do not have the time to properly invest in cassava production. Also, they tend not to harvest the cassava at times when prices on the markets are more favourable. Instead, they harvest when school starts and household expenses are higher, receiving less money for their product. This is also related to the fact that women do not seem to have access to the right networks that could provide them with the correct market information. Cassava is considered to be a crop providing food and income security to households during arduous times, and not a crop offering much potential for profit. This limits the ambitions to develop this value chain.

To address these constraints, a series of proposed interventions were formulated. For example, investing in better machinery and technology would increase the efficiency and quality of the processing activities. Furthermore, the creation of information systems accessible to women would allow them to be adequately informed, in a timely manner, about market supply and demand. Another intervention would aim specifically at reducing women's work burden through the promotion of joint decision-making in the household, involving both men and women. This could be done with the help of household methodologies aiming at improving intra-household relationships, and promoting the idea of a household as a business enterprise. Business development services could be developed for women entrepreneurs at the individual, household and enterprise levels. Also, the development of child-care facilities (potentially in collaboration with cooperatives or other local institutions) for the women involved in cassava processing could significantly reduce their double work burden, allowing them to increase the productivity of the chain.

The experience in Côte d'Ivoire with the cassava value chain clearly demonstrates how some important value chain inefficiencies are rooted in gender-based constraints. A gender-sensitive analysis allowed for these issues to emerge and to identify the underlying causes, and therefore to formulate adequate interventions.

FINAL REMARKS

This paper discussed FAO's approach to gender-sensitive value chain development, arguing that this approach allows the formulation of interventions contributing to more efficient and inclusive value chains. The basis of FAO's conceptual framework is the value chain considered within its wider system. The framework follows and builds upon the existing sustainable value chain development approach, enriching it with a specific gender perspective. The market is given a prominent place, as it is a prerequisite for value chain development.

The framework considers two critical levels: the individual and household approach. These levels tend to be ignored by the traditional value chain approach. As illustrated by the example from the cassava value chain in Côte d'Ivoire, analysing these two levels is essential and allows identifying the root causes of value chain inefficiencies. The individual level encompasses and represents the ability to make use of economic opportunities

in a system, and these abilities are influenced by socially constructed gender roles. The household, in turn, is a system including different stakeholders, resource flows, power structures and relationships affecting women and men's participation and benefits from agricultural production.

FAO's approach to gender-sensitive and sustainable food value chains offers the guidance and tools necessary for a gender-sensitive value chain analysis. The aim of such an analysis is to identify gender-based constraints at every node of the chain, and to identify concrete action for interventions. Ultimately, the implementation of gender-sensitive value chains improves their efficiency and contributes – at a broader level – to economic growth. Importantly, it contributes to more gender equality and thus to social justice, poverty alleviation and food security and nutrition for all.

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Building sustainable and inclusive smallholder farming food value chains in Cameroon: case of the North West Farmers' Organisation

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ABSTRACT

Within the framework of the Batibo-Mezam innovative platform initiated by the Humid Tropics Programme, which seeks to transform the lives of the rural poor through integrated systems research for better impact on poverty and ecosystem integrity, a commodity or food value chain approach was introduced to farming groups of the area. With NOWEFOR and COPSUD partnering to facilitate, strengthen and build the capacities of these farmers, especially women, two important value chains are being developed in the areas of maize and tomatoes. In fact, we have worked to improve market linkages to more than ten producers' organizations based on an inclusive value chain placing emphasis on how small-scale farmers can be incorporated in existing value chains either by increasing efficiency or by carrying out activities further along the chain. Stakeholders include chain actors, facilitators, influencers, supporters, capacity builders, etc.

BACKGROUND AND INTRODUCTION

Background

The Batibo Innovative Platform, now called the Batibo-Mezam Innovative Platform, was initiated in 2014 within the Humid Tropics Program framework after an inception workshop that took place in Yaoundé in February 2014. The Humid Tropics Program seeks to transform the lives of the rural poor in tropical America, Asia and Africa through integrated systems research and unique partnership platforms for better impact on poverty and ecosystem integrity. Its core partners are Biodiversity International, the International Center for Research on Agroforestry (ICRAF) and the International Institute for Tropical Agriculture (IITA). The purpose of the Batibo-Mezam Innovative Platform is to improve the well-being of all actors along selected commodity chains in the Western Highland zone. With a composition of all actors of the food value chain, the Platform aims at addressing farmers' production and marketing challenges through research, dialogue and advocacy.

Following a workshop on Results-based Management System and Communication Strategy that took place in Yaoundé from 27 to 29 July 2015, the initially selected commodities (yams and oil palm) were changed to maize, beans and cassava, as those

initially chosen could not be grown in the selected project sites. This rationale was explained to members of the Platform who validated the change. This was followed by the setting up of demonstration plots in five communities (Bali, Bafut, Batibo, Nsongwa and Bambui) where work is ongoing. However, before the arrival of the project, the North West Farmers' Organisation (NOWEFOR) had been working to improve the maize value chain with some ten producers' organizations such as Nseh, Babungo, Mforya, Ibal, Kai, Nyen, Din, Nseh, Ngondzen and Nchum. With NOWEFOR and Community Partners for Sustainable Development (COPSUD) partnering to facilitate, strengthen and build the capacities of these farmers especially women, two important value chains are being developed in the areas of maize and cassava but the focus in this paper will be on the maize food value chain.

Introduction and concept of value chains

A value chain is the complete set of steps that take a product from its origin to its destination, i.e. "from farm to fork". As part of their efforts to boost agricultural production in emerging economies, agricultural food ("agri-food") companies and governments are heavily investing in their smallholder suppliers. For example, companies, development organizations, technical and financial partners and other actors in development now increasingly provide training and other services to farmers, sometimes with financial support from the public sector and donor agencies. Both the private and public sectors have a role to play in building smallholder value chains. However, for many, working with smallholders is only a recent development. Experience and best practices are lacking, and roles and responsibilities are still being explored. In practice, working with smallholder farmers in a sustainable and long-term way is much more complex than was initially expected.

The practices of smallholder farmers vary greatly and working with them in large numbers means building knowledge and learning from practice is quite complex. Unravelling this complexity, developing new tools and approaches, implementing them and measuring impact are essential to sustainable development progress as well as to building sustainable and inclusive food value chains. Sustainability would therefore mean that the system should be economically viable, environmentally sound, socially inclusive and encourage community participation and – in a nutshell – good governance of the entire system.

In this connection, food value chains (FVCs) comprise all activities required to bring farm products to consumers, including agricultural production, processing, storage, marketing, distribution and consumption. FVCs are changing rapidly in developing countries because of population and income growth, urbanization and the expansion, globally and domestically, of modern food retailing, distribution and wholesaling firms.

In food value chains, the farmer or rancher (and where and how they raise their food, etc.) is core to product quality. People, places and practices matter. Therefore, everyone in the chain, from the seed supplier to the produce broker, becomes interested and invests in making sure the chain produces sustainable farm businesses along the way. One cannot sell local food without local farmers, so business relationships along the chain tend to become more collaborative ("let us get there together") than purely

transactional (“if you do not give me the lowest price, I will find someone who will”). It therefore follows that within the chain it is possible to identify some key functions such as distribution, processing and marketing, and further explore how different businesses found their ways to either take on some of those functions themselves or partner with others to build the FVC.

However, within the framework of this paper, which focuses on sustainable food systems, the sustainable FVC is defined as “the full range of farms and firms and their successive coordinated value adding activities that produce particular raw agricultural materials and transform them into particular food products that are sold to final consumers and disposed of after use, in a manner that is profitable throughout, has broad-based benefits for society and does not permanently deplete natural resources” (FAO, 2014).

In effect, at the heart of the agricultural value chain concept is the idea of actors connected along a chain producing and delivering goods to consumers through a sequence of activities. However, this “vertical” chain cannot function in isolation and an important aspect of the value chain approach is that it also considers “horizontal” impacts on the chain, such as input and finance provision, extension support and the general enabling environment. The approach has been found useful, particularly by donors, in that it has resulted in consideration of all those factors impacting on the ability of farmers to access markets profitably, leading to a broader range of chain interventions. It is used both for upgrading existing chains and for donors and other development actors to identify market opportunities for small farmers.

Therefore, in working to promote market linkages in developing countries, it is often based on the concept of “inclusive value chains”, which usually places emphasis on identifying possible ways in which small-scale farmers can be incorporated into existing or new value chains or can extract greater value from the chain, either by increasing efficiency or by also carrying out activities further along the chain.

Agricultural value chain finance becomes critical at this point because it is concerned with the flows of funds to and within a value chain to meet the needs of chain actors for finance, to secure sales, to buy inputs or produce, or to improve efficiency. Examining the potential for value chain finance involves a holistic approach to analyse the chain, those working in it, and their interlinkages. These linkages allow financing to flow through the chain. For example, inputs can be provided to farmers and the cost can be repaid directly when the product is delivered, without the need for farmers to take out a loan from a bank or similar institution. This is common under contract farming arrangements. Types of value chain finance include product financing through trader and input supplier credit or credit supplied by a marketing company or a lead firm or a microfinance institution or through project microcredit schemes.

It is in this perspective that COPSUD in collaboration with NOWEFOR (an Apex Producers’ organization) are working together to build sustainable and inclusive smallholder farming FVCs in Cameroon with the aim of improving employment and income generation in rural areas particularly for vulnerable groups such as women and youths in the North West Region.

METHODOLOGY

Designing the methodology for this paper was based on the background, the general situation and some problems of the maize subsector in Cameroon identified through field diagnosis.

First, the significance and importance of the maize subsector in Cameroon depicts that:

- It is the third most highly cultivated and produced food crop and cereal (about 800 000 farm families in Cameroon) and the average national production is estimated at about 900 000 tonnes/year (1996–2005); in the North West Region, 189 060 tonnes were produced in 2014.
- It is regularly consumed by at least two-thirds of the population in various forms, at an annual national consumption of about 800 000 tonnes; hence the national need for human consumption stands at 33 kg/inhabitant/year. This is of socio-cultural importance.
- It contributes to more than 150 billion CFAF of the GDP.
- There is an increasing demand since it constitutes in the most part an important ingredient in the production of animal feed (70 percent), and also for brewery industries and transformation and processing into other forms.
- The maize subsector employs more than 3 million people (farmers, transporters, traders, processors, etc.).

Second, some difficulties and challenges hampering the development of the subsector include:

- production and productivity remain quite low, hence resulting in an annual importation of more than 150 000 tonnes;
- rudimentary production techniques and poor yields;
- frequent and huge fluctuations in the supply of the produce in the markets;
- huge post-harvest losses (about 15 percent of production);
- poor market organization as well as high marketing cost (to the tune of 40–50 percent), hence the absence of a link between production and marketing;
- poor access to credit facilities by various business people involved in the subsector to carry out various activities along the chain;
- underexploitation of available natural resources (water, soil, labour);
- inaccessibility of land especially by women due to laws and socio-cultural barriers;
- natural calamities and other vagaries such as floods, droughts, etc.;
- poor organization/structuring of farmers due to absence of group strategies;
- non-standardized seeds and poor quality seeds on the market; insufficient seeds.

Objective of project

The main objective is to contribute to improving the production and incomes of maize producers within the project area.

In a specific manner, it aims to:

- set up a commodity or FVC that is sustainable and inclusive;
- facilitate the use of improved and quality seed material and varieties;

- support the acquisition of equipment and infrastructure necessary for production, storage and marketing of produce;
- support capacity building of producers' organizations and their members;
- assist in the structuring and organization of the FVC;
- improve market linkages between the producers and final consumers.

Selection of stakeholders and determination and description of roles of each chain intervener

Stakeholders in the value chain were selected based on the intensity of their activities and commitment in the chain, as well as their roles and responsibilities necessary to enhance the performance of the value chain. In this connection, five different roles for stakeholders in value chain development were identified and therefore, within the framework of analysing the subsector, it becomes critical to distinguish these roles as follows:

1. Chain actors

These are actors intervening in the chain. They are owners of the product taking risks in the chain: basically buying from other actors, processing the product (in whichever form) and selling the product to the next actors.

2. Chain supporters

Those that supply goods or services to the chain actors, often distinguished as either financial providers (e.g. banks providing loans) or non-financial service providers (e.g. transporters). Transporters can also appear inside the chain depending on the intensity of the activities.

3. Chain influencers

These are actors that influence the performance of the subsector, its actors and their supporters. Those institutions that influence the entire subsector (and beyond) without performing an actor or supporters role: influencers (such as the Ministry of Commerce) determine (partly) the factors (such as investment climate).

4. Chain facilitators

A temporary (catalyst) role by an organization to “grease” the chain machinery, either between the actors at the various levels or between the actors and their supporters, with the objective of improving the performance of the entire chain and its actors.

5. Capacity builders

These are organizations and institutions that build the capacity of certain groups of chain actors. Their activities are non-commercial and non-operational, such as strengthening farmer cooperatives, associations, etc., for example non-governmental organizations (NGOs), the Ministry of Agriculture and Rural Development (MINADER), the Microfinance and Micro Enterprise Program. This Program is aimed at providing, in proximity, adapted, affordable and accessible financial services to the poor who do not have access to mainstream, formal financial institutions.

PRESENTATION OF FIELD RESULTS(WORKING TOWARDS A SUSTAINABLE AND INCLUSIVE MAIZE VALUE CHAIN)

Capacity building, use of modern production techniques and yield per hectare

Capacity building remains an important instrument in knowledge and information dissemination to ensure sustainable and inclusive FVCs for smallholder farmers. Therefore, in order to encourage and promote cohesion among members of producers' organizations for better results and improved yield as well as adding value to their end-products, it was necessary to train them not only in group dynamics and leadership, advocacy, negotiation and marketing but also in modern agricultural production techniques and integrated pest management, and responsible use of agrochemicals with the aim of reducing the amount of toxins released into the environment. Besides these, hands-on and on-farm training sessions were organized to increase the level of absorption of knowledge acquired from trainers and facilitators.

Consumption and use of maize

In Cameroon, maize is consumed in various ways according to regions and the technologies available. It is used for:

- direct human consumption in the form of boiled and/or roasted cobs, grains and flour or pap;
- animal feed (chicken, pigs, etc.) as raw material;
- the production of starch in local industries;
- brewery industries.

Human consumption

(i) Local consumption:

- an annual national consumption of about 800 000 tonnes of maize for human consumption which represents about 75 percent of the total annual production.
- The national need for human consumption stands at 33 kg/inhabitant/year. (*Source: Long-term Food Plan*)

(ii) Exportation to some neighbouring countries and in the Economic and Monetary Community of Central Africa (CEMAC) subregion:

- Exportation is limited due to internal high demand and difficulties linked to access to external markets.
- The quantity of maize exported to neighbouring countries of the subregion is estimated at 50 000 tonnes/year, representing 6 percent of the national production.

Animal feed

(i) Local consumption:

- The local demand for maize destined for the feeding of animals is becoming very high in Cameroon. This high demand is due to an increase in intensive livestock rearing. Animal feed production consumes about 20 percent of the total production.

(ii) Agro-industries

- Agro-industries involved in the compounding of animal feed (*Société des Provenderies du Cameroun, etc.*) are the principal consumers of maize grains. Their demand

usually surpasses supply. They consume about 60 percent of the 180 000 tonnes destined for animal feeding. However, the supply has hardly satisfied their real needs.



Photo 1. Training of farmers in integrated pest management and responsible use of agrochemicals

Other uses

- Starch production industries are currently being developed in Cameroon. Their demand for maize grain still remains limited but a potential increase in demand is envisaged within a period of five years (about 40 000 tonnes/year).
- The brewery industries are not very interested in local maize and the annual need of these industries, which stands at about 50 000 tonnes, is covered by importation for the following reasons:
 - (i) The system of national production does not guarantee permanent and consistent availability of maize stock for these industries.
 - (ii) The quality of local maize does not meet the specific needs of the industries.

This maize and some of its by-products are imported from United States of America, Argentina, South Africa, etc., usually in the form of maize grains, seeds, maize starch, maize oil, fresh maize, frozen fresh maize, etc.

The quantity of maize imported stands at about 150 000 tonnes/year on average (1996–2015) (*Source*: Department of Agricultural Statistics).

Cultivation of maize

Production

The maize crop

Climate

The climate in Cameroon is generally good for the cultivation of maize.

Soils

Cameroon, with a great variety of soils, offers favourable conditions for the cultivation of maize in almost all the agro-ecological zones (rich soils, deep, well-drained and above all with enough organic matter).

Cropping system

- The extensive or traditional farming system: Always associated with other plants, characterized by small surface areas of less than 1 hectare, void of manure and fertilizers and usually practised by about 95 percent of local farmers. This is subsistence farming where about 75 percent is devoted to household consumption and only the extra production is sold.
- The semi-intensive system: Non-motorized without association with other crops, characterized by average surface areas of more than 1 hectare, with an average

application of pesticides and fertilizers and paid labour, practised by less than 4 percent of the farming population. More than 75 percent of the production is meant for the market.

- The intensive system: Motorized and practised by less than 1 percent of farmers, without association with plants characterized by large surface areas of more than 10 hectares, greater quantities of fertilizer and pesticide application. All the production (100 percent) is meant for the market.

Varieties

- Traditional varieties, e.g. kasai.
- Improved varieties, e.g. coca, ATP.
- Hybrid coming from the Institute of Agricultural Research for Development (IRAD) and other countries (pannar from South Africa)

Seeds

- Three types of seeds are used in Cameroon according to where they come from:
 - **Seeds produced by farmers themselves** taken from previous harvests with a very low yield (less than 2 tonnes/hectare).
 - **Seeds obtained from agricultural research centres (IRAD)** with good yields of (4–7 tonnes/hectare).
 - **Imported seeds** with a good yield (5–8 tonnes/hectare) but very sensitive to diseases.
- **Seed production activities are well developed in high maize production zones.**
- **Local seed producers are producers' organizations for their members and individual researchers at the level of research centres.** The availability of good quality maize seeds was ensured by training 29 seed producers in appropriate techniques of seed production and preservation. Refresher training sessions were also intensified in Bafut, Batibo, Babungo, Din, Nyen, Mforya, Mundum, Ngondzen, Nseh, Nchum and Bambui, Kai and Ibal-Oku unions during which 697 farmers will acquire knowledge on appropriate techniques for land preparation, manure application, planting distances, planting times, diseases and weed control. The acquisition and distribution of improved maize seed to members will contribute to an increase in maize production this year. Losses incurred during production will be minimized by training the farmers in post-harvest and stock management.
- **The average cost of a kg of maize seed is very high according to farmers (500–2000 CFAF).**
- **The quantity of seeds produced locally is insignificant (50 tonnes/year) compared with the demand from farmers estimated at 1 000 tonnes/year).**

Maize is produced on about 200 000 hectares of land in Cameroon.

Yields

Yield varies according to the cropping system and production techniques practised (less than 1–3 tonnes/hectare/year).



Photo 2. Mono cropping system



Photo 3. Intercropping system (maize interspersed with groundnuts and cassava)

The number of farmers involved in maize production is increasing among the NOWEFOR farmer unions. This year 705 members were involved in maize production; 423 hectares of land were cultivated with an average farm size of 0.6 hectares per farmer. The total production this year summed up to 675.8 tonnes with an average yield of 1.59 tonnes/hectare.

Producers

- Many farm families are involved, representing about 3 million smallholder farmers (one-third active in the agriculture sector).
- Women represent about 90 percent of maize producers.

Governance, interaction and movement along the value chain

Structuring/organization

→ *Subsector (value chain) organized around two main organs:*

- General assembly
 - Supreme decision-making organ
 - Membership = registered members in the subsector
- Local management committee (LMC), which comprises:
 - President
 - Vice-president in charge of marketing
 - Secretary in charge of input supply
 - Local animator
 - All these leaders are elected in the general assembly.

Specific duties

→ *Local management committee*

- Carries out sensitization so as to increase membership, savings and loan repayment
- Identifies training needs and ensure the realization of training for the value chain
- Assists selected beneficiaries for financial support

- Organizes and runs meetings
- Identifies members' input needs and ensure their availability
- Mobilizes members and communities to organize group marketing and also carry out market research
- Organizes exchange visits and field days
- Negotiates funds from microfinance institutions for members
- Ensures planning of activities and its self-evaluation
- Ensures the existence and application of basic texts (internal rules and regulations [IRR], etc.)

→ *Local animator/market representative*

- Assists follow-up activities of the value chain
- Mobilizes members/communities to organize group actions such as marketing
- Assists in input supply organization (quantification, mobilization of funds, purchases, distribution)
- Helps farmers to reflect on local solutions to problems identified during field visits
- Assists in organising group marketing (ensures collection of quality and standardized produce from members)
- Prepares and forwards periodic reports to the LMC

Functioning of the value chain

- Organized in such a way that basic texts are designed to guide its functioning.
- The IRR indicate:
 - the mandate of elected management organs – three years renewable once
 - enrolment modalities – 1 000 CFAF/member
 - modalities of benefiting from micro credits and how to repay
 - sources of funds, etc.
- *Financial mechanisms:*
 - COPSUD sources funding for the promotion and development of this value chain.
 - These funds, if obtained can be granted in the form of microcredit (100 000 CFAF/qualified member).
 - Funds are revolving and they also ensure refinancing of this value chain.
 - The technical staff in charge ensures follows up of the distribution and use of funds, as well as implementation of projects.
 - Reports forwarded to donors on a periodic basis depending on the requirements of the donor in question.
 - Donors go down the field to ensure that their funds are properly used for the purpose for which they were intended so as to avoid fungibility.
 - External evaluation follows suit.

Put in place a marketing strategy and linkages as follows:

- Formation of producer and marketing associations

- Setting up marketing centres
- Establishment of collection points (bulk-building and warehousing)
- Formation of market management committees
- Identification of buyers
- Identification of transporters
- Involvement of traditional and municipal authorities in mapping out sales points in local markets

In fact, more than ten producers' organizations have improved market linkages based on an inclusive value chain placing emphasis on how small-scale farmers are incorporated in existing value chains either by increasing efficiency or by carrying out activities further along the chain. Even though these actions have been ongoing, it becomes critical to scale up the practice within the project area.

So far 253.3 tonnes of maize were sold in group and individual sales compared with 194 tonnes that were sold in 2014. There were five group sales and close to 53 individual sales. A 15-litre bucket of maize sold at between 2 500 and 3 000 CFAF. Besides, Babungo, Ibal-Oku, Din, Ngondzen, Nseh and Bafut, and unions such as Nyen, Batibo and Mforya are becoming interested in the production and marketing of maize.

Difficulties/constraints

- Insufficient financial support from the partner/support service
 - Inadequate collaboration/cooperation from members as far as group marketing is concerned
 - Conflict of power between group members
 - Reticence in the repayment of micro credits
 - Negative effects of climate change (prolonged drought and propagation of pests)
- ☞ Consequently
- ☞ The food value chain risks disintegration and collapse

Interaction and movement along the value chain

COPSUD's flow chart for the maize value chain is given in Figure 1.

RECOMMENDATIONS

Therefore, in order to build sustainable and inclusive food value chains we need to:

- organize and redynamize producers' organizations to be able to become fully engaged in commercial agriculture (second to third generation agriculture) with more focus on women and youth groups and associations;
- put in place food value chains and render them functional while providing adequate financial, material and human resources and means, which will go a long way to create employment opportunities at every level of the chain;
- facilitate access to microcredit facilities for maize farmers especially at grassroots level so as to fight hunger and reduce poverty; this microcredit scheme can also help in carrying out income generation activities to enhance the performance of the value chain;

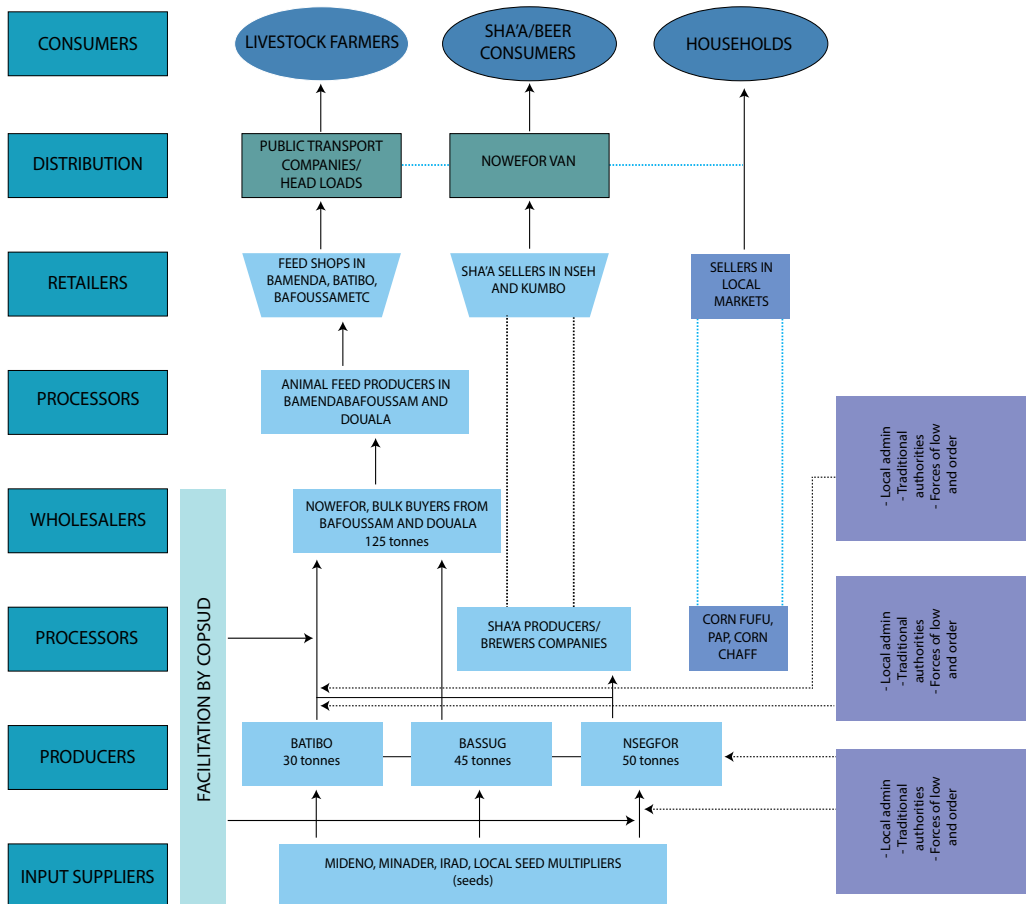


Figure 1: COPSUD's Flow chart for the maize value chain

Note: MIDENO: North West Development Authority; NOWEFOCH: North West Farmers' Credit House; BASSUG: Bambui Union of Sustainable Groups; NSEGFOR: Nseh Group of Farmers' Organisations.

- assist in the provision of adequate infrastructure (storage) and equipment (processing, transformation, mechanization) as well as fertilizers and pesticides to increase production and productivity and to continue addressing the problems of post-harvest loss especially in rural areas;
- work in collaboration with all stakeholders especially at grassroots level to discuss and put in place coping mechanisms (indigenous) to fight the effects of climate change and environmental degradation and render such communities resilient;
- mobilize policy-makers, development actors, research institutions, civil society organizations and donor agencies to get fully involved in making FVCs a reality in promising production basins in their communities by working out a framework that would make them sustainable and inclusive;

- organize and carry out actions of advocacy for government and donor agencies to provide subsidies to farmers and other actors promoting the value chain necessary for the acquisition of agricultural machines, off-farm inputs, etc.;
- encourage and promote a system of contract farming or an “outgrower scheme” that can improve environmental, economic and social impacts in communities and maize production basins;
- improve the market information system and flow among various stakeholders to keep them informed of current commodity prices in markets.

CONCLUSIONS

Value chain development could be an important innovation in Cameroon if the various stakeholders involved commit themselves fully to its activities and actions.

This could go a long way to boost production and productivity of smallholders and also get them well organized and structured within specific value chains in agricultural production especially the maize subsector, which has a high potential in reducing poverty and food insecurity in both urban and rural areas in line with SDG No 2.

Only joint and coordinated efforts can produce spectacular results.

LESSONS LEARNED

- Introduction of innovative farming practices with smallholder farmers is a gradual process. Also, youths and women must be actively engaged in agriculture in order to ensure sustainability.
- For sustained agricultural production among farmers, there is a need to finance production activities in one way or another. Also continuous capacity building is needed to make agricultural activity more professional and more profitable.
- Policy-makers in the agriculture sectors need to be constantly reminded of the plight of farmers for appropriate policy formulation and implementation in favour of the farmers.

IMPACTS AND PERSPECTIVES

- *Creation of employment opportunities in the subsector*
 - Today the subsector has employed small-scale farmers, traders, transporters at the upstream of consumers, intermediary consumers (livestock breeders), industrial level, etc. According to official statistics, more than 20 percent of the active population of Cameroon is unemployed; hence engaging in the cultivation of maize can reduce the rate of unemployment to about 8 percent.
- *Satisfaction of the local and regional demand and contribution to economic growth and the gross domestic product.*
- *Ensuring food sovereignty of the country*
 - Maize constitutes one of the major food crops that can guarantee food sovereignty in Cameroon.
 - The dependency of the country vis-a-vis importation of various maize products and by-products will be largely reduced, hence a reduction in loss of currency leaving the country.

- The country's food security will be ensured and guaranteed, hence increasing its capacity to intervene and participate in humanitarian emergencies around the subregion.

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The economic impacts of geographical indications: evidence from case studies

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ABSTRACT

Geographical indications (GIs) can be used as tools for the development of sustainable food systems, and stakeholders at local and international levels often require economic data relating to the development of GIs, especially in terms of impact. With this in view, FAO has developed a collaboration with experts and Masters/PhD students to analyse the data collected from ten cases around the world. The analysis provides some clear evidence about the economic impact of GIs. This paper synthesizes some results by focusing on three well-differentiated cases.

INTRODUCTION

Geographical indications (GIs) may be implemented as tools for the development of sustainable food systems, particularly in some FAO projects (FAO, 2009). Stakeholders in the field often ask for economic data on GIs, especially in terms of impact. Nevertheless, little work has been done to collect representative empirical data and to analyse the economic impacts of GIs as a whole in order to draw clear-cut conclusions (Aragrande, 2013). In addition, although the economic impacts of GIs have been well documented by various researchers (Moschini, Menapace and Pick 2008; Josling, 2006; Dinopoulos and West, 2010; Rangnekar, 2004; Jena and Grote, 2010), empirical demonstration of the net benefits of GIs is relatively sparse, especially in countries where GI procedures are more recent (outside Europe). The objective of this paper is to present results from three cases: Futog cabbage from Serbia, Penja peeper from Cameroon and Colombian coffee. The three cases provide different economic impacts according to their context.

METHODS AND SOURCES

The methodology was developed in the frame of a collaboration between FAO and four universities, involving professors, researchers and experts on GIs.¹ The methodology's objective was to measure the capacity of the GI to generate economic effects in terms of price and, when possible, income for producers and economic resilience, with qualitative and quantitative data (prices, gross margins and incomes for farmers and market)² as well as to analyse the causal mechanisms.

The theoretical framework mobilized for the evaluation of GI impacts built on: (i) the theories' corpus about asymmetry of information between agents and GI as a quality signal; (ii) the economics of GI as a differentiation tool allowing producers to escape from the competition on the mass market, linking with reputation and consumer willingness to pay; and (iii) the rural development perspective, which implies the value added goes upwards in the value chain and supports the economic welfare of the farmers from the territory concerned.

Within this framework, we focus on "operational GIs", i.e. GI processes that reflect GI characteristics, in terms of: (i) the effective "link to the terroir" (characteristics of the product that are linked to the natural and human factors (Casabianca *et al.*, 2011) that is "translated" into a consistent code of practice (with norms and controls that allow a labelling of the "character of the product"); (ii) as a result of the collective intellectual property right, the collective action developed by GI producers that can be analysed through the governance of the value chain; and (iii) the link to market that comes from the collective marketing strategy.

Based on this framework, ten cases were selected for which Master or PhD students collected quantitative and qualitative data during field research. The collected data have been completed with official data, when available, and then analysed under a diachronic (before and after GI registration) or synchronic (comparison of two similar products) approach.

Three cases, summarized in Table 1, are presented in this paper to illustrate a diversity of economic impacts.

¹ ETH Zurich, Agricultural Economics Group; VetAgro Sup, Clermont-Ferrand; School of Agricultural Studies of Angers (ESA Group) within the specific framework of the Food Identity MSc; Montpellier SupAgro.

² A broader analysis (the meso or even macro levels) was not considered in the present work, but may be so on a subsequent occasion. This work should lay the foundations for a methodology that can be replicated in the context of a wider study – if the results justify it.

Table 1: Key data about the three products

Product	Green cabbage (fresh and sour)	Green, black, white or red pepper	Green and roasted coffee
No. of producers	31	~160	+ 550 000
Quantity produced	~ 460 tonnes	200–300 tonnes	~ 780 000 tonnes
Territory	5 000 ha/Serbia	6 municipalities/Cameroon	All country/Colombia
Market	Local market	Domestic and regional market	Export
Specificity	Thin, elastic and flexible leaves	Fresh flavour and delicate musky aroma	Arabica coffee, wet processing method, specific aroma

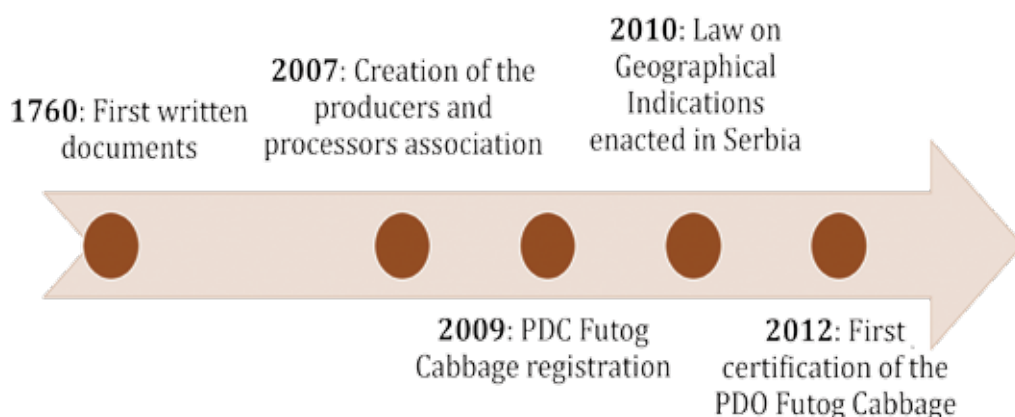


Figure 1. Futog cabbage (*Futoški kupus*) GI process

RESULTS

A diversity of economic benefits is observed as a result of the GI process in the three cases.

Futog cabbage (*Futoški kupus*), Serbia

Product

This is a white cabbage, fresh and fermented from a local and old variety with seeds that are preserved thanks to producers' know-how. Produced among other varieties of cabbage in the Danube plain in the north of Serbia, Futog cabbage has organoleptic characteristics that give it its specificity (thin, elastic and flexible leaves).

The protected designation of origin (PDO) was registered at the national level in Serbia in 2009 to protect the name (see Figure 1 summarizing the history of registration), which was often misused, and preserve this variety, which is less productive and increasingly being replaced by more robust hybrid varieties.

Approximately 460 tonnes of Futog cabbage are produced annually by 20 producers. This production is less than 1 percent of the production of white cabbage nationally. The main market is the domestic one for fresh and fermented cabbage. The fermented cabbage is exported in small quantities (8 percent of sales).

Main outcomes

The main outcomes regarding the economic impacts of the GI process and PDO registration are two-fold. The volumes of fresh cabbage produced decreased by 76 percent between 2009 (before the PDO registration) and 2014 (see Table 2). This can be attributed to the certification that discourages non-GI producers to use the GI, i.e. an effective fight against the misuse of the name.

This decrease in volume together with an increase in differentiation/reputation can explain the second important impact: the increase in the cabbage price. Producers who have adopted the PDO experienced significant price increases over the period 2012–2014.

Table 2: Futog cabbage (*Futoški kupus*) price evolution between 2012 and 2014

Open markets	+ 150%	Diachronic analysis
Wholesalers	+ 110%	
Processors	+ 19,91%	
Farm level	+ 101,33%	
On the road	+ 71,80%	

Regarding redistribution of values along the chain, the GI process did not affect the distribution terms of the existing value: the processor (for fermented cabbage) did not increase the price paid to farmers for the GI fresh cabbage. This is explained by a weak bargaining power of the 20 producers facing

a single processor, who is in a position of strength. This is accentuated by the perishable nature of the fresh product that requires producers to sell quickly to the processor.

Penja pepper

Product

Penja pepper is cultivated in the littoral region in Cameroon, more precisely in the Mounjo district. In the 1950s, a generic variety of pepper was introduced in Cameroon. It has developed strongly since the 2000s in an exceptional terroir. The Penja pepper is an origin-linked pepper, with a production of 200–300 tonnes annually, representing less than 1 percent of global production of origin-linked peppers. The domestic market is the main consumer, followed by the regional market.

The GI process took place under the Pampig (Projet d'Appui à la Mise en Place d'Indications Géographiques) project, which started in 2008 under the African Intellectual Property Organization (OAPI) leadership, involving the French agricultural research and international cooperation organization (CIRAD) and the French Development Agency (AFD). Following the establishment of the code of practice, control plan and association creation, the GI Penja pepper was officially registered as a geographical indication at the OAPI level in 2013.

The objective of the GI registration was to protect the reputation of the product and to contribute to the value chain organization (see Figure 2 summarizing the history of registration).

Main outcomes

The number of producers increased from 42 to 330 after the establishment of the protected geographical indication (PGI) and in the production area of the PGI. This increase is remarkable, not only in Penja District but also in other surrounding districts (included in the production area of the PGI), where the production of pepper had not yet developed.

The positive impact of the GI, however, comes primarily from cultivation and post-harvest practices. Training was organized for members of the producers' organization called the Groupement Représentatif de l'IG Poivre de Penja (GRIGPP); knowledge is then disseminated beyond. Despite the higher production costs that these techniques involve (about 2.5 additional MCFA/year/hectare), the final product quality and production efficiency improved. The following price increase, both at producers' and wholesalers' level, helped offset these higher production costs due to the adoption of new techniques. For example, the price at the beginning of harvest increased by 118 percent after the PGI registration; by 129 percent at the end of harvest.

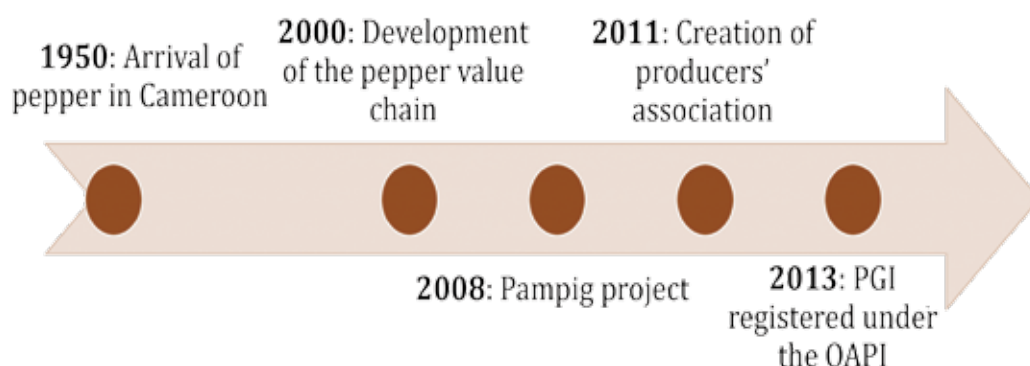


Figure 2. Penja pepper GI process

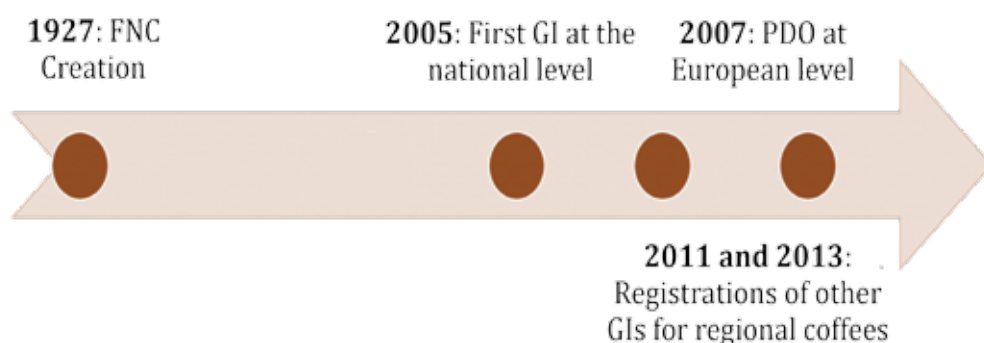


Figure 3. Colombian coffee GI process

The profitability of production per hectare also increased by about 116 percent for producers who adopted these new techniques between 2006 and 2015.

Colombian coffee

Product

Colombian coffee is an Arabica coffee, processed wet, green or roasted, produced in the Colombian highlands between 400 and 2500 metres along the Andes mountain range, representing almost all of the Colombian production. Colombia is the world's second largest producer of Arabica coffee: about 13 million bags of 60 kg, of which nearly 85 percent is exported in green grain, 4 percent in roasted coffee and only 11 percent is for domestic consumption.

The producers have implemented a strategy to protect the reputation with the official recognition of the geographical indication registered in 2005 at the national level and in 2007 in the European Union (see Figure 3). This strategy built on an old strategy of origin-linked differentiation, initially linked to trade promotion with the Juan Valdez trademark registered in 1950, as an image of the Colombian coffee grower, then linked to the creation of the trademark Café de Colombia in 1980.

Main outcomes

Quantitative analysis, conducted by mobilizing the integrated control approach, shows that the PGI adoption has increased coffee prices paid to producers. Indeed, in the absence of the PGI, the prices paid to Colombian coffee growers would have declined. For example, the price paid to Colombian coffee growers observed in 2010 was USD1.81 for 500 g, and it would have been USD1.23 in the absence of the PGI. On average over the period 2008–2012, there was a price differential of USD0.38.

Moreover, the PGI adoption has increased the share of international prices received by coffee growers in Colombia. The analyses show that, before the introduction of the GI, for each dollar collected by the National Federation of Coffee Growers of Colombia for the sale of coffee, 68 cents were given to producers, while after the adoption this share rose to 85 cents.

However, these results remain to be qualified because the bargaining power between producers and intermediaries remains unbalanced. Indeed, the results of the quantitative analysis show that the price cuts are more easily transmitted to producers than the increases in international prices (asymmetric transmission), indicating a high concentration and a high intermediation level downstream of the value chain.

Finally, origin differentiation approaches and protection have not helped to improve buffering of international price shocks. The results show that there is no difference in terms of shock absorption before and after the PGI adoption. Thus, despite the PGI adoption, Colombian coffee remains a commodity on export market: PGI failed to limit the effect of international market price fluctuations in the price of coffee in Colombia.

CONCLUSIONS

These three products, compared in Table 1, illustrate some positive economic impacts as a result of GI implementation: higher prices, wider protection of the name against misuse, higher quality for consumers.

Other impacts vary by case: higher income for producers (pepper, coffee), access to new markets (pepper), introduction and diffusion of innovative practices (pepper), better governance (pepper, coffee), maintenance of a traditional variety (cabbage).

These cases also show important mechanisms that lead to economic impacts:

- the legal/institutional context that can enhance effective control and fight against misleading/misuse of the name;
- the diffusion of innovation through the code of practice that can increase yields or reduce the cost of production;
- the collective action and governance through the GI organization and value chain

coordination that can reduce the costs of transactions, increase economies of scale, attract new producers and investments and improve value chain efficiency;

- the related marketing strategy based on differentiation and specific rules over the production that can increase market access or supply control.

More broadly, taking into consideration all the ten cases, this study shows that the economic impacts of GIs vary according to different factors:

- The local context, i.e. the local conditions for the GI establishment and management but also the legal and institutional framework.
- The code of practice.
- The type of product (commodity on export market vs local product).

However, in line with previous studies, it shows that, apart from the legal and institutional context, the main factors that influence economic impacts are the governance within the value chain and the institutional framework and support (Barjolle, 2015; Barjolle and Philippe, 2012; Barjolle and Sylvander, 2002; Quiñones Ruiz et al., 2015).

GI development is a long-term process in which efficiency, namely on economic issues, is context-related and closely linked to the stakeholders' involvement. It is quite a flexible tool that can be suitable – when there is a potential – for a wide variety of people, places and products.

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Smallholder farmer participation in the modernizing dairy value chain in Zambia

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ABSTRACT

Market and foreign direct investment (FDI) liberalization in Zambia in the 1990s has led to the modernization of the dairy subsector in the 2000s. That modernization has taken place not only in dairy retail and second-stage processing, but also in the segment with which the small farmers directly interact – first-stage processing and local milk collection. In this latter segment has emerged the modern channel's rural entry point – the Milk Collection Center (MCC). A national census of the MCCs is used to describe the rapid growth of the MCC model in Zambia. Based on a farmer survey, the study found that participation in the MCC value chain is determined by location, training, and cooperative membership, thus with mixed effects on smallholder producer inclusion. Duration as an MCC supplier is correlated with capital accumulation and technology change. The implications centre on the need for policy-makers to facilitate smallholder farmers' engagement in collective action and access to modern infrastructure.

INTRODUCTION

Since 1991, the Government of Zambia has liberalized its markets leading to fundamental structural change in the national food system. Parastatal companies were privatized, commodity markets were deregulated and foreign direct investment (FDI) was both encouraged and facilitated (Neven *et al.*, 2006; Saasa, 1996). This resulted in the 1990s and 2000s in substantial FDI by regional and global agri-food firms in Zambia, in particular in the downstream segments of second-stage processing and retailing. New, more stringent public and private food quality and safety standards emerged. Markets were highly dynamic due to urbanization and a growing middle class. These drivers led a modernization process

of the dairy value chain. Modernization often leads to the exclusion of smallholder farmers as the system becomes too demanding. In the case of the modernizing dairy value chain in Zambia, however, this study found that it did not lead to the exclusion of smallholders (in general) but rather offered a sustainable growth opportunity.

THE MODERNIZATION OF ZAMBIA'S DAIRY VALUE CHAIN

From 1991, demand and supply side factors have transformed the dairy value chain in Zambia. *On the demand side*, urbanization, rising incomes and related lifestyle changes have increased the importance of the formal market channel part of the dairy value chain. For example, Sng (2002) found, in a national consumption survey of 150 households, that urban households consume nearly four times as much milk per capita as do rural households. These urban households not only consume more milk, they are also far more likely to buy milk from the emerging modern retailers who procure from dairy processors in the formal sector. Two important trends since the early 2000s that continue to have a positive impact on job creation and household income in Zambia are: (i) the sustained growth of the copper industry due to high demand from China (especially since 2003); and (ii) the continued foreign investments in commercial farming operations.

On the supply side, the initial shock was provided by the Government of Zambia (GoZ), whose structural adjustment policies in the dairy value chain included: (i) privatization, starting from 1996 when Bonnita (now Parmalat) bought the Dairy Produce Board; (ii) market deregulation, which led to the establishment of a new quality-based raw milk pricing schedule that created a price incentive to producers; (iii) reduction of financial and technical government support; and (iv) trade liberalization, but with non-tariff barriers blocking the import of fresh milk into Zambia. These policy shifts threw a weak and unprepared dairy value chain to the forces of an open market. In the vacuum left by the GoZ, new players gradually emerged and started to re-organize the dairy industry.

There were also two key systemic changes that took place in 2010. The first is the GoZ's enactment of the Dairy Industry Development Act. The Act is meant to regulate the dairy industry so as to develop an efficient and self-sustaining dairy industry that will effectively contribute towards poverty alleviation, household food security and employment creation. The second key development was the creation of the Dairy Association of Zambia (DAZ), from a merger between the dairy commodity committee under the Zambia National Farmers' Union (ZNFU) and the Zambia Dairy Processors Association (ZDPA). DAZ represents all categories of dairy producers, processors and dairy-related agribusinesses.

EMERGENCE AND EVOLUTION OF THE MILK COLLECTION CENTER MODEL

Local raw milk supplies to the modern processing industry initially came from large suppliers (privatized state dairy farms) combined with imports of milk powder (for reconstituted milk and dairy products). Gradually the Milk Collection Centre (MCC) model emerged, especially from the early 2000s. By 2014, the situation looked as indicated in Table 1.

Table 1: Dairy production in Zambia by producer type 2014

Characteristic	Traditional smallholder livestock farms	Emerging dairy farms	Large commercial dairy farms
Number of farms	300 000	3 500	50–70
percent of cattle in Zambia	80 percent	15 percent	5 percent
Estimated production	135–185 million litres	35 million litres	60 million litres
Farm-level production	1–3 litres/day	25–200 litres/ day	2 000 litres/day
Most common breed	Traditional breed (Zebu)	Mixed breed	Pure dairy breed
Yield (litre/cow/day)	1–3	8–16	20–28

Source: in the absence of reliable data, these numbers are rough estimations by the authors based on Valeta (2004), Emongor *et al.* (2004), World Bank (2011), ACF (2011), and key informant interviews and surveys.

The MCC model in Zambia was characterized by: (i) subsidized support; (ii) careful targeting (location, farmers); (iii) physical infrastructure (buildings, collection tanks, etc.); (iv) the creation of cooperatives; (v) training in production, processing and business; (vi) contracts between producers and processors; (vii) access to quality inputs (artificial insemination, feed); and (viii) value-adding (e.g. retail packs produced by cooperatives).

Since 2000, there has been a steady expansion of the MCC model, which offered smallholder dairy producers a readily available, reliable market for their milk and linked them to modern processors. By 2013, there were 43 MCCs, spread out to seven of Zambia's ten provinces (Southern, Northern, Eastern, Western, Central, Copperbelt, Lusaka), but with a concentration (22 out of 43) in Southern Province. Most of this MCC raw milk is sold to Parmalat, which collects milk from MCCs in Southern, Lusaka and Copperbelt provinces.

Around half of the suppliers bring in the milk by bicycle. This creates a natural maximum radius of about 30 km that determines the catchment area of an MCC. At the same time, if supplies to an MCC remain below 500 litres per day, transportation (of minimally 1 000 litres every other day) between MCC and processing plant is uneconomical thus causing a breakdown of the MCC model. In order to bring more farmers into the model while still maintaining efficiency, expansion of an MCC started to take on a hub-and-spoke format with new satellite MCCs being smaller and simpler (just milk collection) and linked with farmer cooperative-owned trucks to the larger, earlier-established MCCs. For example, in the Southern province there are three such hub-and-spoke MCCs: Magoye (one satellite), Monze (two satellites) and Choma (five satellites). While a few of the established MCCs petered away, most took root and expanded rapidly (see Figure 1).

Not only did the number of MCCs increase, the number of members per MCC and the average volume of milk supplied by each MCC member also increased. For example, the oldest of the smallholder dairy farmers groups (the Magoye Smallholder Dairy Farmers Association) has grown from 25 members supplying 27 000 litres (around 1 100 litres per member) in 1996 to 280 active members supplying 725 000 litres (around 2 600 litres per member) in 2013. Overall, between 1998 and 2013, raw milk supplies from MCCs increased from 435 000 litres (from 2 MCCs) to 10 million litres from 43 MCCs, an average annual growth rate of around 23 percent, sustained over a 15-year period (Figure 2). There is a great



Figure 1. Expansion of the MCC model in Zambia between 1998 and 2013

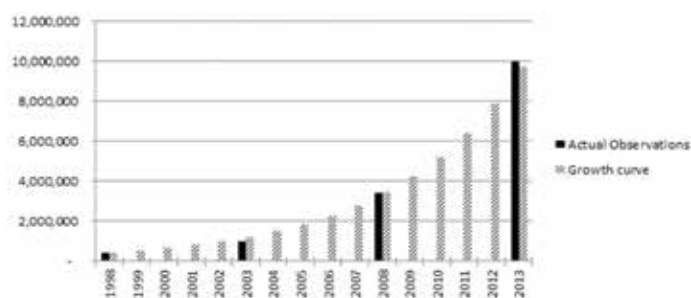


Figure 2. Annual raw milk supplies from MCCs 1998–2013 (litres)

Source: author's MCC survey 2013.

in size and gained experience, some started to use part of the supplied milk for value-adding and selling these value-added products into local markets, which includes direct sale to consumers (mostly), as well as (in decreasing order of importance) institutional buyers such as educational and health facilities, local processors, traders and shops. For example, the Choma MCC has continuously increased the level of sophistication of its growing operations. Five farmer cooperatives feed into the Choma MCC, each with their own cooling tank. The central MCC is set up as a processing plant that pasteurizes milk, makes yoghurt and sells its milk in branded plastic bags to local buyers. Furthermore, these MCCs have diversified their operations also by selling inputs (feed, veterinary drugs), providing training to members and running other businesses such as hammer mills. Parallel to this, an increasing number of individual members (emerging dairy farmers) grew their dairy operations to the point where the volumes were large enough for the processor to send a truck around for picking up the raw milk directly from the farm. These farmers graduated from the MCC model and started to operate independently rather than through the MCC.

SMALLHOLDER FARMER PARTICIPATION IN MODERN DAIRY CHANNELS

For this study, a random sample of 420 smallholder dairy farmers were interviewed in the MCC clusters in Monze and Choma, which were selected because these are older units in Southern province, Zambia's main milk production area, and as such have a long enough history and sufficient farmers in both channels to make an analysis of farmer participation in the modern channel over a longer time period feasible. The 420 farmers consisted of 244 in the informal channel and 176 in the formal (modern MCC) channel. They were asked about their dairy activities over a 12-year period. Duration analysis, a particular econometric tool, was used to answer two research questions: (i) what drives entry into the modern channel; and (ii) what is the impact on technology and assets of participation in the modern channel.

In terms of who participates in the modern channel, the main findings were that it was older, better educated smallholder farmers with a higher income and better access to pasture land who accessed the modern dairy channel. Cooperative membership, training and especially location (distance to the MCC) were further key determinants of modern channel participation. Women were found to be a stark minority in both channels although there was a marginal improvement in their share of the total number of farmers when comparing the traditional with the modern channel (4.7 vs 6.6 percent).

variation in the size of the MCCs. The three largest MCCs represent over 50 percent of all raw milk supplies. In fact, the largest MCC supplied a volume that equals the combined volume of the 37 smallest MCCs in 2013.

As the MCCs (and their association-owners) grew

In terms of the impact of participation in the modern MCC channel, the study found that duration as an MCC supplier has a significant positive impact on the use of improved feeds (more purchased feed and concentrate geared to specific types and ages of animals) and on farm assets owned by the farmer. This finding clearly reflects the strong positive development outcome of participation in the modern channel for smallholder farmers in Zambia's dairy value chain.

CONCLUSION AND IMPLICATIONS FOR DEVELOPMENT POLICY AND PROGRAMMES

We found that modernization of the dairy value chain in Zambia did not exclude smallholders, but rather offered a sustainable growth opportunity (for some!). Our national census of the MCCs described the rapid growth of the MCC model in Zambia, while our farmer survey showed that participation led to capital accumulation and technological change.

The implications for policy-makers are two-fold. First, there is a continued need to provide capacity building and to create an enabling environment that facilitates collective action by smallholders, especially in the initial stages of development. Second, there is a need to facilitate the investment in modern infrastructure at the production and initial processing stages, and in building the capacity of farmer collectives to manage these infrastructures. Key to the sustainability of the smallholder dairy support programmes in Zambia were: (i) the initial verification that there is a viable business model; (ii) collective action; (iii) the design and application of integrated solutions around the MCCs; and (iv) a sufficiently long and intensive support that was gradually phased out as farmers reached certain thresholds.

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The Rural Competitiveness Project: facilitating market access for small rural producers

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ABSTRACT

The Rural Competitiveness Project (COMRURAL) contributes to improving the productivity and competitiveness of producers/organized rural workers through the establishment of strategic alliances with commercial technicians, both financial and private, in the framework of agri-food value chains. The project is aimed at improving the competitiveness of the rural sector. Besides the principle of competitiveness, COMRURAL considers other principles: joint venture, mutual benefit, investment demand, associativity and social, environmental, economic and institutional sustainability. It consists of an organizational structure that allows operation, coordination and monitoring of its goals with the different actors involved in its implementation at national and local levels.

INTRODUCTION

Honduras is a lower middle-income country with persistent poverty and inequality challenges. With a total population of 6.8 million, about 70 percent are considered poor and 53 percent live in extreme poverty. In rural areas, these figures rise to 82 percent and 62 percent, respectively. These figures have remained largely unchanged since 1997. The scarce employment and limited livelihood options available in rural areas have been major driving forces of Honduras' significant level of emigration (World Bank, 2008).

The Rural Competitiveness Project (COMRURAL) aims to improve the rural sector's capacity to adopt modern market mechanisms and manage business risks by fostering sustainable partnerships between the public and private sectors, which would help synchronize the investments in private goods with the progressing public goods environment. Using differentiated incentives under a transparent and market-driven scheme, the project aims to operationalize a partnership model that allows relevant stakeholders to build mutual credibility, which would thereby provide incentives to the commercial and private financial sectors to share risks in the rural productive investments.

In the process, the project addresses key challenges to raising rural competitiveness, such as low land and labour productivity, limited access to productive assets, technology, information, credits, diversification of agricultural products, and access to markets.

COMRURAL PROJECT

The COMRURAL is an initiative of the Government of Honduras led by the Ministry of Agriculture and Livestock with financial support from the World Bank and the Swiss Agency for Development and Cooperation.

The principal objective of the National Council for Sustainable Development (CONADES), is to promote programmes and projects that promote sustainable development. It offer forums, workshops or appropriate means for planning them to exchange ideas and information with the various sectors of civil society and at the municipal level. As stipulated in its founding decree (decree No. Cm-14-94), the operational mandate of the Council is a joint participation of the public sector and civil society to maintain the coherence and consistency of policies, programmes and projects for sustainable development. It has, therefore, mainly a coordination function.

CONADES presents the development of value chains through the experience of the COMRURAL and under the auspices of the Executive Decree has received support to implement an integral progressive tool, generating profits at all levels and exemplifying experiences in sustainable development strategy, the above consistent with the mandates of the Rio +20 Summit and COP 21, in addition to compliance with the rural producer organizations.

Challenges faced by small producers

The challenges that are faced by small producers are:

- low productivity
- need for technological innovation
- poor logistics (rural infrastructure)
- low competitiveness
- limited market access
- under a partnership approach, Small farmers can have access to technology and funding to deal with these challenges

Responses to these challenges from COMRURAL

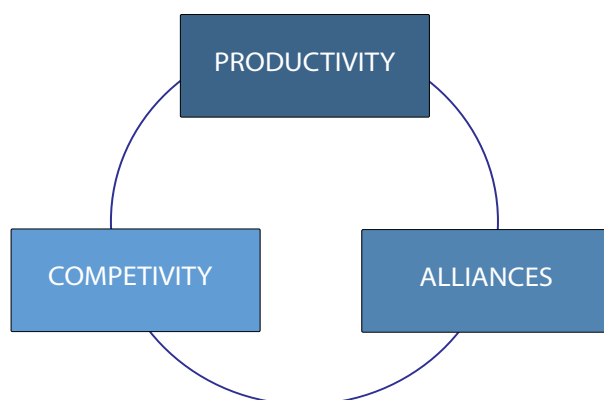


Figure 1. Three components to the COMRURL project

The COMRURAL project contributes to improving the productivity and competitiveness of producers/organized rural workers through the establishment of strategic alliances with commercial partners, private financial and technical actors, in the framework of agri-food value chains. There are three components to the project (Figure 1; Box 1). The first component is the support to productive alliances. It will support pre-investment activities

Box 1: The projects three main components:

- establishment of strategic productive alliances with mutually beneficial arrangements between producer organizations with one or more partners, that is, the establishment of formal links among producers as the next link in the value chain is proposed;
- provision of technical services (financial and non-financial) and building their capacities to develop partnerships and realize their business relationship; and
- development of business plans that, among other issues, include investment, expected market results and counterparts for the partners, based on a scheme where “*todos ponemos – todos arriesgamos – todos ganamos*” (we all can – we all take a chances – we all win).

to: (i) promote the project concept and outreach to the Rural Producer Organizations (RPOs), commercial partners and private financing entities; (ii) create and consolidate productive alliances among RPOs and commercial partners; (iii) identify potential business opportunities, including, inter alia, opportunities with respect to basic grains, on the part of the productive alliance; (iv) fully prepare the business opportunity into a business plan; and (v) build capacity among technical service providers to enhance the quality of their services provided to the productive alliances. The second component is the productive investments. It will provide subproject grants to co-finance the implementation of approximately 150 feasible business plans formulated under the first component. In order to become eligible, a business plan must be financially feasible, entail a concrete productive alliance, and have secured up-front resources from the private financial sector (minimum of 30 percent) to support the business plan. Finally, the third component is the project coordination, monitoring, and evaluation. It will support the incremental costs associated with the project administration, monitoring, including the setting up and implementation of a participatory monitoring and evaluation system (World Bank, 2008).

It supports small producers/rural workers organized in private companies, smallholder organizations, producer associations or cooperatives that have legal personality or that have acquired it during the process of joining the project. The COMRURAL project will benefit at least 5 280 families of small producers.

The project focuses on seven departments of West-Central Honduras (Figure 2): Comayagua, La Paz, Intibucá, Santa Barbara, Lempira, Copan and Ocotepeque, representing 22 percent of the national territory. The project intervention areas have productive potential, access roads and potential markets where there is a network of value chains and capital to be promoted within the competitive framework of the Project.



Figure 2. Seven departments of the Central West of Honduras

Source: COMRURAL, 2016.

Profile content of the business plan

The preparation of a business plan is the result of identifying investment opportunities and expressions of interest from a group of actors that are willing to work under the partnership scheme, which involves sharing risks and contribute to the solution of barriers to achieve a common goal. This group presents its proposal to the project coordination unit in order to be evaluated according to the criteria of eligibility and prioritization defined in the operations manual of the project.

The information contained in the business plan should include the following:

- description of the project(s) product(s)
- identification of the beneficiaries
- technical aspects
- market aspects
- financial aspects
- environmental aspects

Value chains concerned

- APICULTURAL CHAIN

Defying the reality of climate change, COMRURAL takes advantage of the variety in the final production of apicultural products by increasing the possible market.

The apicultural chain may submit business profiles that include the following:

- adding value to products, by changing, improving or transforming the presentation of the primary product;
- transformation of agro-industrial products;
- improvement or change in production systems of products through the introduction of technological change aimed at improving crop productivity and profitability;
- initiatives containing a combination of components of value added processing and marketing;
- adoption of good agricultural practices and safety regulations;
- strengthening technical and managerial capabilities and others in rural producer organizations.

- HORTICULTURAL CHAIN

In this chain new technologies and tools are being implemented in the area of water resource management by maximizing water use.

The vision is to exploit and optimize the soil resources.

- FRUTICULTURAL CHAIN

We apply the integration and inclusion of holistically labour generated by these products.

We took advantage of the variety of presentations that each producer can prepare examples: jellies, wine, concentrates etc.

- AQUACULTURE CHAIN

Productivity of these resources, despite the climatic impacts, has had a positive growth compared with previous years.



Figure 3. Example of the horticultural chain

- **RURAL TOURISM CHAIN**

Development of tourist routes involving other chains supported by COMRURAL.

Good practices in tourism services.

Rescue gastronomic culture.

Ecotourism, agrotourism and colonial tourism.

- **POULTRY CHAIN**

- **BEANS CHAIN**

- **RICE CHAIN**

- **CORN CHAIN**

- **SWINE CHAIN**

- **MEATS CHAIN**

- **DAIRY PRODUCTS**

- **HANDMADE PRODUCTS CHAIN**

Constitution of the process

Initial requirements:

- at least 1 year of organization experience
- organized by the rural producer organizations (OPRs)
- located in the area of influence of the Project
- minimum of 12 families

Objectives:

- 10 percent increase in gross sales of OPRs based on the implementation of its business plan
- Private investment in the form of loans to producer organizations representing at least 50 percent of the amount invested in the public sector
- Participating producers have increased productivity by 20 percent

The project includes, among its beneficiaries, the Lenca indigenous peoples and Maya-Chortí in the intervention areas of the project, as well as the participation of other vulnerable groups such as women and youth, who are the poorest population groups and who, because of their social and economic conditions, are vulnerable and marginalized in the development process of communities.

Investments benefit 39 producer organizations specializing in coffee in the West-Central region of the country and 3 740 families, generating about 10 000 jobs. The funds are enabling organizations to diversify and promote products for export, strengthening technical and business skills, providing better incomes for families and improving competitiveness in the production, processing and marketing.

- SPECIALITY COFFEE CHAIN

- 41 producer organizations in the West-Central region.
- 3 969 participating families
- Exports increased by 12 percent (4545.360 quintals) equivalent to 6.2 million dollars.
- The rural producer organizations positively faced the crisis of rust disease.
- Productivity has increased from 21.11 quintals of dry parchment by apple today to 23.81 quintals.
- 67 percent of CONRURAL chains correspond to the chain of specialty coffees.

CONCLUSIONS

At least 70 percent of the project participants have successfully implemented the measures of gender, youth and indigenous communities when applicable, as in his capacity development plan. There has been significant advances in the social indicators: 1 844 women 29 percent; 731 Young 12 percent; 2 560 Indigenous 42 percent; and 75 Business plan execution 6 444 Partners.

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The World Banana Forum: a multistakeholder platform to develop practical guidance for sustainable banana value chains

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ABSTRACT

Multistakeholder platforms (MSPs) have become an increasingly used method to address issues in a holistic manner in order to include different views and opinions, producing better and effective results. MSPs have been demonstrated to be compelling engines to create strong public–private partnerships (PPPs). They attain institutional impact on the development and implementation of policies for sustainable growth. However, complex and ground-breaking international platforms face a diverse number of challenges including power relationships, platform composition, stakeholder representation and participation capacity, trust building, legitimacy, effective governance and accountability, decision-making powers and mechanisms, loss of institutional memory, facilitation and coordination and costs associated with maintaining an MSP.

The paper presents the above-mentioned challenges faced by MSPs in a critical context within the global banana industry; and the World Banana Forum (WBF) as a pioneering platform that successfully addresses challenges faced by stakeholders around the globe. The overall aim of the WBF is to achieve substantial legislative improvements for sustainable banana production and trade. The paper includes an example of fruitful cooperation in effective PPP under the WBF umbrella, which has demonstrated concrete institutional impact on occupational health and safety (OHS) matters in Ecuador.

INTRODUCTION

Scholars describe multistakeholder platforms as:

decision-making bodies (voluntary or statutory) comprising different stakeholders who perceive the same resource management problem, realize their interdependence for solving it, and come together to agree on action strategies for solving the problem (Steins and Edwards, 1999, p. 244).

It follows that a mechanism that is inclusive and broad in scope will achieve consensus and satisfy all stakeholders. The benefits are several, as the UN Global Compact reports:

These platforms allow the establishment of standards and norms, help define best practice, and facilitate sharing and learning among participating companies and organizations. In addition, they spur innovation and provide recognition to

companies that are leading efforts to tackle the issue, thus mitigating first-mover disadvantages that still exist with respect to certain practices (United Nations Global Compact, 2013, p.10).

Nevertheless, MSPs are far from perfect and require effective leadership in order to produce worthwhile results. The core objective of MSPs in global agro-food supply chains is to address issues of sustainability by engaging all the partaking stakeholders. The goal is to pursue a common objective towards joint problem solving, adding value to solutions that would otherwise be limited to unilateral initiatives. Moreover, an MSP process strives for institutional impact on policy development and implementation for sustainable development.

Economic growth and job creation are crucial to development. However, development cannot rely solely on governments or on the private sector. It is everyone's responsibility. Stakeholders recognize that sustainability challenges require a new type of management. Businesses, civil society organizations and governments have to be at the forefront of this transformation. Confronting poverty and marginalization through MSPs and PPPs is crucial to creating wealthy and inclusive societies. In this respect, public-private negotiation offers a significant platform for businesses, civil society organizations and governments to fruitfully engage in generating participatory and sustainable economies.

These partnerships are key to building business-enabling environments. These partnerships are voluntary. The participation is driven by the shared benefits from the process on a long-term basis. Partners understand that they can pursue shared goals through alliances and collaboration despite their different roles and objectives.

Government policies within MSPs must generate an atmosphere in which businesses may thrive. In order to facilitate this endeavour, MSPs seeking to create business-enabling environments must therefore:

- identify challenges to business growth and develop action plans;
- explore protruding matters that weaken the business environment and hamper economic growth;
- conduct analysis and research to facilitate using relevant information required for policy development processes and subsequent implementation;
- strengthen stakeholder capacity;
- share information on challenges and potential solutions, promoting better levels of understanding and confidence among stakeholders;
- support the creation of new policies and contribute to the implementation of new legislation and regulations.

The private sector's role in promoting growth, employment and innovation should not only be acknowledged, but private sector participation in determining development policies on a regional, national and/or global scale should be encouraged as it would provide more opportunities for advocacy to facilitate business and marketplace improvements. Private sector involvement in shaping the post-2015 development agenda is required to attain this objective.

Progress, particularly in relation to sustainable development, hinges on a social capacity for different sectors and interests to be able to constructively engage with each other (Woodhill, 2004).

Moving forward with the implementation of sustainable practices, it is clear that the private sector must be involved. Yet, on some issues, in some industries, the leading voices come from civil society organizations and government agencies.

The World Banana Forum (WBF) convenes governments, producers and their organizations, trade unions, cooperatives, exporter groups, fresh producing companies, retailers, traders, consumer associations, research institutions, universities and civil society organizations to tackle issues that concern the global banana industry. In such endeavours, the WBF recognizes the expertise, action capacity and other invaluable resources that the private sector contributes to MSPs. Private companies play an important role in determining banana policies. Therefore, private sector participation in an MSP setting is preferable to the alternative.

The WBF has succeeded in implementing common projects with visible results in the field. The Banana Occupational Health and Safety Initiative (BOHESI) attained institutional impact on policy development and implementation for sustainable growth on occupational health and safety (OHS) aspects in Ecuador, the main banana exporting country. OHS malpractices and pesticide use are key challenges in the global banana value chain, affecting millions of workers worldwide and resulting in environmental destruction.

WHY AN MSP ON BANANAS?

The banana is the most exported fruit in the world both by volume and economic value. Out of the almost 100 million tonnes of bananas that are consumed every year, about 20 million are exported bananas. More than five million of those come from Ecuador. It is the fifth most-traded agricultural commodity (after cereals, sugar, coffee and cocoa) but the conditions and prices prioritize the cheapest production possible, even when it violates labour rights or is pernicious to the environment. It represents an important means of income and employment for millions of rural families in least developed countries (LDC) countries. Consequently, bananas generate several environmental, economic, social and political problems on a global scale.

Banana numbers

- Production: estimated around 145 million tonnes in 135 countries.
- Worth around USD45-billion.
- Provides a source of income or food to some 400 million people.
- The fifth most important food crop in least developed countries.
- The most produced and exported fruit reaching 20 million tonnes and contributing to the economies of over 25 developing countries.
- A staple starchy food and important source of income for over 80 million people in Africa.

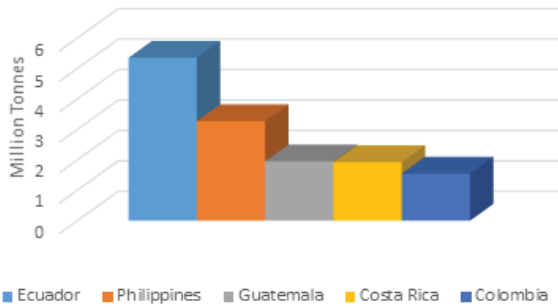


Figure 1. Top five banana exporting countries (2013)

Source: FAOSTAT.

and there is little awareness of the steps it took to make them available in non-tropical areas at a low price (Cohen, 2009). Behind the inexpensive fruit, there are usually workers earning low wages and working long hours, who remain invisible in the global supply chain. The hardships banana workers endure in the field and the generally poor working conditions are the price paid for cheap bananas.

To make matters worse, the environmental impact of banana production is one of the most noxious in agriculture. The chemical sprays used to fend off disease and pests also have a serious and negative effect on the workers' health, the community and local wildlife. Bananas are quite controversial, so much so that economic wars have been waged in the past. Even today, they continue to incite economic and political disturbances.

The “banana wars”

The “banana wars” were a series of trade disputes over policies, mainly in the developed countries of the Americas and Europe, which peaked between 1993 and 2001 (Wiley, 2006). The main arguments revolved around the actors in North America preferring free trade and low tariffs for banana exports, while their European counterparts, wanting to protect the banana industry in their former colonies in Africa and the Caribbean, favoured higher tariffs, import licences and gave trade preferences (Myers, 2004).

In the early 1990s, the nations in Europe signed the Lomé Convention, which restricted the amount of bananas imported from Latin America, allowing more imports from banana producing countries in Africa and the Caribbean (Wiley, 2006; Myers 2004). By 2001, a new round of negotiations began for a new trade agreement that would please both parties (Myers, 2004). The trade disputes were the cause of several ripples within the World Trade Organization (WTO). Negotiators from the countries involved in the banana wars reached a solution, the Geneva Banana Agreement, in December 2009, that would gradually reduce tariffs throughout the years from €176/tonne to €114/tonne (WTO, 2012).

The banana wars showcase the importance of this product in the globalized agricultural industry and trade, and the weight that multinational corporations have in determining trade policies.

The banana trade epitomizes economic difficulties in the world trade market and the globalization of the agricultural economy. As the main exported fruit, the banana has become a staple product, making it crucial for economic and food security.

Bananas are so common as a grocery item that it is often forgotten in developed countries that bananas are a tropical fruit,

Social issues related to banana production

The main cause of social challenges in the banana industry is the supermarket-led competition for the lowest possible price (BananaLink, undated [a]). The largest burden is carried by the workers in the plantation who receive unsustainably low wages. By some estimates, only eleven cents make it to the plantation out of every dollar spent on a banana at the supermarket. Others place it even lower, at five cents per dollar (Hamer, 2008). In both estimates, the few cents received at the plantation are then divided up, leaving even less for workers' wages.

The banana workers' health is also cause for concern. There are two main health impacts that affect plantation workers. The first is the use of often banned, toxic chemicals for pest control, exposure to which leads to physical damage, cancer and in some cases death (Hamer, 2008). Work place accidents must also be considered. The use of dangerous materials or hazardous conditions can cause bodily harm, which is often left untreated, not to mention uncompensated (BananaLink, undated [b]).

Other issues include poor job security due to short-term contracts, poor housing conditions at the plantation and gender discrimination. Women are subjected to sexual harassment, which is seldom addressed by the employer. They earn three to four times less than men who carry out the same duties.

Impacts on the environment

Banana production has a large ecological footprint. It has negative effects on the air, water and land. In addition to the natural soil depletion caused by banana trees, the use of pesticides also causes harm to the environment. There has been an increase in the use of these chemicals because there is only one variety of banana that is grown for trade: the Cavendish. This increases the fruit's vulnerability to pests and diseases. As a response, stronger chemicals are used. The use of pesticides is substantially higher than for other crops, reaching 30 kg/hectare/year (Hamer, 2008). To add to these negative externalities, bananas are also responsible for about two tonnes of waste for every tonne of bananas produced (Hamer, 2008). The waste includes various materials that are used in the production, harvesting and shipping stages of banana trade.

THE WORLD BANANA FORUM

The global prosperity and leadership of the banana sector, which directly benefits millions of producers and consumers, is rather complex. The intensive large-scale production and the constant decrease in price have caused a variety of economic, social and environmental challenges for the banana industry. These problems can only be solved by effectively involving all stakeholders on a global scale and undertaking ground-breaking initiatives.

History

Two international conferences preceded the creation of the WBF, during which the aforementioned challenges were discussed and solutions brainstormed. The second conference, in 2005, gathered around 250 stakeholders in the banana sector and agreed on the need to

establish a permanent multistakeholder forum. This decision was reaffirmed in a series of meetings and workshops held from 2006 to 2008 with the participation of the United Nations Conference on Trade and Development (UNCTAD), the International Labour Organization (ILO), FAO, representatives from the governments of banana exporting and importing countries and non-governmental organizations (NGOs). The stakeholders suggested that the forum be facilitated by the United Nations as ensuring neutrality was deemed a critical factor for success.

In 2009, FAO, with co-funding from the Department for International Development of the United Kingdom (DFID), implemented the Multi-stakeholder Forum on Sustainable Banana Production and Trade (MSF) project. The MSF facilitated a preparatory committee composed of a balanced number of representatives from the banana industry, civil society organizations and national governments whose role was to lead the formation of an international forum on sustainable banana production and trade (“World Banana Forum”).

The Forum was held at FAO headquarters in Rome in December 2009 with the participation of over 150 representatives from the banana sector worldwide. The participants agreed on the key issues affecting the industry and prioritized their resolutions. They formed specialized working groups to carry out activities addressing these issues. Notably, they decided to establish the World Banana Forum.

The WBF is a space where main stakeholders in the global banana supply chain work together to achieve industry-wide consensus on best practices for sustainable production and trade. The WBF believes that collaboration is the key to change. The WBF brings together retailers, importers, producers, exporters, consumer associations, governments, research institutions, trade unions and civil society organizations to find pragmatic solutions for the betterment of the industry.

The fact that the WBF is an international multistakeholder platform makes it an exceptional case in the food sector. The main objective of the WBF is to disseminate information and promote the global adoption of sustainable practices for banana trade and production. To accomplish this, the WBF has three permanent working groups to promote:

- sustainable management of natural resources;
- mitigation of the effects of climate change and uncontrolled environmental impact;

WBF working groups in a nutshell

The WBF has three main working groups (WG) that address the most urgent sustainability challenges:

- WG01 – Sustainable production systems and environmental impact (environmental sustainability): promotes the sustainable management of natural resources, mitigation of environmental impacts and adaptation to climate change.
- WG02 – Distribution of value (economic sustainability): seeks to work towards a fair distribution of value along the banana supply chain.
- WG03 – Labour rights (social sustainability): promotes respect for human rights, labour rights, occupational health and safety at work, gender equity and decent work.

- respect for human rights (labour rights, health and safety at work);
- promotion of gender equity;
- fair distribution of value along the supply chain;
- knowledge-sharing as a tool for development (sharing information on best practices).

Environmental sustainability

WG01 deals with sustainable production systems and environmental impacts. This group works to contribute to a better understanding of the main problems related to banana production and to develop a map for improvements in sustainable banana production.

In addition, this working group produces knowledge platforms on best environmental and social practices, discusses banana diseases and the consequent use of pesticides, and works on specific actions to measure and reduce carbon and water footprints.

One of the main challenges the banana industry currently faces is the *Fusarium oxysporum* f. sp. *Cubense*, tropical race 4 (TR4). TR4 is a soil pathogen that has infested banana plantations in South-East Asia and Pakistan, and has more recently been reported in Jordan, Mozambique and Australia. TR4 is a growing concern for the industry as it colonizes, infects and destroys Cavendish banana plants. One of the main objectives of WG01 is to coordinate the global efforts to prevent and manage this major disease threatening food security, the livelihoods of banana farmers and exporting countries, mostly located in the Latin American and Caribbean region. The WBF decided to catalogue it as a priority task given the importance of TR4 to all the parties involved, creating a specific task force led by WBF specialists in TR4. The task force could play a critical role in coordinating the activities of governments, private sector organizations, researchers, producer organizations and other NGOs, promoting consensus on best practices among stakeholders and advocating for tangible actions in the global banana sector.

Economic sustainability

WG02 strives to achieve a fair distribution of value throughout the banana supply chain. Its objectives are to identify key actors at every stage of the supply chain, create a value distribution map for key supply chains, agree to a practical methodology to work towards a decent remuneration in plantations, and explore the viability of this methodology in producing countries.

Currently, the working group's main objective is to study the costs of sustainable production, which is directly related to its ongoing research on living wages. Data are collected in a strictly confidential manner and then processed to include externality indicators, when possible, so that an operator can measure the social, environmental and economic impacts of the prices paid.

In collaboration with civil society organizations and research institutions, WG02 produces studies on: social life cycle evaluation (a methodology developed to emphasize the social investment impacts in the value chain); minimum wages and living wages; and collective bargaining methods between unions and companies, and distributors and producers, with respect to the attainment of living wages; as well as detailed studies on the banana value chain in its European and American markets.

Social sustainability

WG03 aims to improve labour rights. Its priorities include the support for capacity development in terms of free association and collective bargaining, occupational health and safety, and gender discrimination in hiring practices and in the workplace.

One of the main objectives of WG03 is occupational health and safety. Work has begun on two innovative initiatives in Ecuador and Cameroon, countries chosen for their interesting productive characteristics and market relevance.

The Banana Occupational Health and Safety Initiative (BOHESI) is a unique coalition of banana companies, retailers, civil society organizations, trade unions, government representatives and certification agencies. Its goal is to contribute to banana production and trade that is environmentally and socially sustainable, improving living standards (particularly in relation to health and access to natural resources) for male and female banana workers, farmers and surrounding communities.

Workers, trade unions and employer representatives will create effective and functioning committees trained in labour aspects of health and safety in producing properties and farms in Ecuador. The public, private and civil society sectors (including trade unions and community organizations) will be encouraged to constitute subject-competent tripartite commissions in Ecuador. Additionally, all stakeholders in the banana industry will have access to relevant bibliographic resources related to the use of pesticides as well as on broader issues within the initiative's spectrum of action, thereby ensuring mechanisms for replication of results in other countries and actors in the banana industry.

In order to achieve these results, there will be a focus on: sharing and systematizing the existing resources on OHS; developing a best practices manual and customized training materials; implementing training workshops and capacity-building programmes; and disseminating best practices, resources and lessons learned.

In collaboration with civil society organizations, research institutions and production entities, WG03 also produces studies concerning labour relations, identifying successful cases in the banana industry in Latin America and African countries. Additionally, it forms part of and facilitates a dynamic group specialized in gender equality.

In summary, the mission of the WBF is to promote collaboration among multiple stakeholders in order to produce practical results for the improvement of the banana industry and achieve consensus on good practices in safety and occupational health, gender equity, environmental impact, sustainable production and correct distribution of value among its actors.

CHALLENGES FACED BY MSPS

As with any convention of diverse ideas and opinions, challenges curtailing the effectiveness of MSPs are commonplace and often insurmountable. Several challenges to MSPs are rooted in power relationships and interpersonal interaction among stakeholders. By far the most common is the power struggle that arises when powerful stakeholders communicate and negotiate with less powerful stakeholders. According to Nicolas Faysse (2006), power imbalances cannot be ignored if the MSP is to function properly; too often, it is erroneously assumed that the MSP is a levelled playing field for all stakeholders.

If not addressed, power imbalances may lead to decisions emanating from the MSP that do not fully represent the scope of opinions of all stakeholders. In these cases, ensuring that the MSP has a fair facilitator in its convenership is of utmost importance. In fact, several scholars, experts and leaders who study and work with MSPs agree that “bringing stakeholders together can be extremely difficult as the starting point is often one of conflict and complexity and existing power imbalances enhance challenges” (Wilton Park, 2014).

However present these challenges may be, strong and fair facilitation within the secretariat can help ensure a smoother process and yield concrete results. In a gathering of contrasting viewpoints, it is helpful to have a body in a facilitating role to help move the process forward. It is no surprise that one of the main recommendations from a review of the United Nations Global Compact suggested that convenerships should focus strongly on building trusting relationships and a common sense of purpose among stakeholders (Gitsham and Page, 2014). Such a feat is especially challenging when MSPs are international, intersectoral and at times working in a controversial arena such as the banana industry.

In April 2014, Wilton Park (UK Foreign and Commonwealth Office) and the World Bank Group, with the support from different donors, held a forum in which leaders and experts met to discuss challenges facing multistakeholder initiatives (MSIs). Their conclusions highlighted the need to encourage engagement through MSPs between civil society, the private sector, government and relevant stakeholders. It was emphasized that MSIs need to make a number of adaptations, including: advancing the advocacy tasks of civil society; bringing themselves closer to the private sector; ensuring that they provide value to donors, utilizing their financial and knowledge input in order to make MSIs work better; ensuring participation at the local level; and making sure that all stakeholders are winners. It is necessary to acknowledge that bringing governments on board can be particularly challenging, although possible with the right engagement strategy. The Open Government Partnership, the Kimberley Process, and Extractives Industry Transparency Initiative (EITI) have all been successful in this regard.

The main ideas emanating from the Wilton Park forum belaboured the fact that the key to success for an MSP lies in the ability to neutrally facilitate the imbalanced power dynamics. Strong facilitation must meander through the challenges of having culturally, linguistically and politically different stakeholders and deliver fair, representative results that capture the differences but still progress towards the end goal. This can be rather difficult as the representatives from the private companies, civil society organizations or governments will often change due to turnover or change in leadership, resulting in loss of “institutional memory” (Wilton Park, 2014).

The degree to which power relationships affect MSPs cannot be overstated, as Nicolas Faysee (2006) points out in identifying key challenges for MSPs. All stakeholders will have their own viewpoints and motives, but different tools and unequal abilities to achieve their goal. Therefore, the facilitating body must balance between neutrality and fairness, in which an active role is taken to address the power disparities. Other challenges for MSPs include: the composition of the platform; the actual active participation by stakeholders, who sometimes take a passive role in the forum; the decision-making powers of the forum; and lack of financial resources or technical knowledge.

Similar hampering trends have been identified by other scholars. Adekunle and Fatunbi (2012) bring up the low participation within the forum from the private sector, while remaining active in the value chain, and the dysfunctionality of policy-makers due to low interaction with stakeholders. They too emphasize the need for strong and effective facilitation, drawing attention to soft management and interpersonal skills, such as communication and active listening. In fact, fostering a positive relationship among stakeholders is crucial to the success of the MSP. The facilitator must focus on trust building, ensuring legitimacy and accountability and creating a sense of shared purpose in the MSP (Gitsham and Page, 2014). It is hoped that by focusing on these personal skills and relationships there will be an increase in commitment, communication and engagement from all stakeholders (Cadilhon, 2013).

The costs associated with maintaining MSPs with enough capacity to overcome the above-mentioned challenges need to be analysed. Appropriate financial contributions from members, regardless of their economic activity, are required due to a diverse number of factors, mainly a crucial feeling of ownership. Funds stemming from the private sector could create discrepancies related to power imbalances. An international agency such as FAO could succeed in hosting an international MSP, but minimum internal funding is required to guarantee basic operations. In doing so, the neutrality would guarantee a progression towards a sustainable agenda.

A SUCCESSFUL CASE STUDY ON MSPS

The WBF has a clear vision of what the goals and challenges are for the MSP. It collects a set of data and values about how to promote change and studies methodologies that will guide the platform's actions and employs a set of tools to put the methodologies into practice. It utilizes the institutional expertise and skills from FAO to execute its role in facilitation.

However, facilitation goes beyond having good facilitators. The Secretariat's guidance within the different stakeholder groups has an earnest effect on the result of its initiatives. Numerous aspects are associated with the institutional context (policy, legal, capital, administration, cultural) that will affect any multistakeholder initiative and must be carefully considered.

The political, social and economic power of diverse groups and how these dynamics affect conflicts are often overlooked. A large part of facilitation revolves around the work facilitators execute with members to prepare a specific initiative tailored to the requirements of a unique situation. There are numerous practices and methodologies a convener can combine to build a strategy. With the assumption that initiatives never go exactly as envisioned, a facilitator needs the skills and expertise to be adaptive and to refine the initiative as it unfolds.

The WBF Secretariat understands the need to engage partners for different initiatives. It is desirable that this engagement lasts as long as possible to avoid a loss of institutional memory. Since 2009, the WBF has gathered a mass of relevant collaborating actors sufficient

enough to attract other actors and to have a real impact on the banana global supply chain. In addition, long-term relationships among WBF actors inspire trust among members, mitigating the effect of power dynamics. Busy representatives from large corporations find time to cooperate with NGO managers sharing common objectives.

The WBF works with a balanced representation of stakeholders from all parts of the banana industry, ensuring legitimacy. These stakeholders, amassed since the WBF's formation, create a knowledgeable platform with common objectives. The knowledge, skills, experience and training acquired by WBF members for effective facilitation and coordination are strong assets for success.

As part of FAO, the WBF offers a knowledge platform to build member's capacities, increasing their participation in WBF's decision-making processes. In addition, the feeling of ownership increases thanks to FAO's binding procedures allowing only alliances with reputable partners. FAO guarantees effective governance and accountability.

AN INSTITUTIONAL IMPACT ON HEALTH AND SAFETY

The Banana Occupational Health and Safety Initiative (BOHESI) forms a unique coalition of governments, smallholders' associations, banana companies, retailers and civil society organizations within the WBF. It aims to contribute towards more socially and environmentally sustainable banana production and trade with improved standards of living for male and female banana workers, farmers and surrounding communities. The initiative began in two countries: Ecuador and Cameroon. It is expected that the direct impact on OHS aspects in both countries will expand over 250 000 ha of banana plantations, including over 3 000 farms that employ over 250 000 people, and produce over five million tonnes of bananas per year.

The project aims to achieve the following results:

- Workers, unions and employer representatives will create well informed, fully functioning and effective workplace health and safety committees in partner-owned and supplier farms in both Ecuador and Cameroon.
- Government, businesses and civil society (including unions and community organizations) will form effective national tripartite commissions on OHS in Ecuador and Cameroon.
- All industry stakeholders have access to relevant resources on health and safety in banana production, both related to the impact of pesticide use and broader health and safety issues and mechanisms, to ensure replication of project outcomes in Ecuador and Cameroon among other banana industry countries and actors.

The main activities in order to reach the results are:

- sharing and systematization of existing OHS resources;
- development of a best practice manual and tailored training materials on OHS;
- implementation of training workshops and capacity-building programmes for government trainers, plantation representatives and smallholders;
- dissemination of best practices, resources and lessons learned;
- creation of a knowledge bank with relevant information on OHS.

Throughout 2015 and 2016, the WBF Secretariat worked to enable a permanent dialogue among the industry stakeholders (government, banana companies, smallholders, retailers and civil society organizations) and supported advocacy activities with the Ecuadorian Government to ensure that health and safety as well as environmental legislation was implemented. The agreements achieved during this period facilitated and provided an important legislative basis to be incorporated in the National Manual on Occupational Health and Safety, allowing workers to negotiate and collaborate with employers in the reduction and elimination of workplace hazards (especially as they relate to pesticides).

The agreements with the Ecuadorian Government will not only help facilitate workplace OHS committees but also national tripartite OHS commissions to ensure a permanent platform for improvements on health and safety. This partnership with the Ministry of Labour, Institute of Social Security and the Ministry of Agriculture will boost the results expected by donors, project partners, smallholders and WBF members. The accomplishment of the partnership is expected to make a real change in OHS aspects in Ecuador and subsequently on worker conditions. The results of the project became a starting point for a new regulation in Ecuador on OHS for the agriculture sector.

In this respect, the WBF had a unique opportunity to have an impact at an institutional level. According to WBF objectives: “Public–private partnerships are becoming a collective tool to bring together the strengths of both companies and governments to include smallholder farmers in global trade”. Despite the fact that this level of institutional commitment requires medium- to long-term processes, the BOHESI/WBF coordination team hopes to fulfil its agreements with the Ecuadorian Government before mid-2017. The facilitation provided by the WBF and subsequent partnership with the Ministries of Labour and Agriculture and the Institute of Social Security boosted the results expected by donors and project partners. As a result, in September 2016 the BOHESI manual was adopted by the Government, becoming the national manual on OHS for the banana sector.

In this connection, the project could benefit more than 220 000 banana workers in Ecuador alone. The partnership with the Ministry of Agriculture and the private sector will contribute in multiplying the number of beneficiaries of the training sessions. The Ministry of Agriculture extensionists will be trained and disseminate the BOHESI training materials, especially among smallholders and smallholder associations. At the same time, private sector partners will focus on plantation owners, covering largely the Ecuadorian banana workers’ collective. Both the public and private sector components feed off each other in creating a compact strategy to improve OHS aspects in Ecuador through a successful example of public–private partnership.

The most important lesson is the need for a neutral convener regarding effective collaboration between the private sector, civil society and the Ecuadorian Government. This situation demonstrated that there is a business case for precompetitive cooperation between companies and organisms in real competition for the betterment of the banana workers’ collective.

In addition, the WBF also cooperates with the International Labour Organization (ILO) to improve the appropriate functioning of the tripartite commissions in the country

and support a possible ratification of the ILO's Convention 184 on occupational health and safety.

CONCLUSION

Businesses in the new era must aim for higher standards with regard to their actions. They must move beyond the current understanding of economic sustainability into a new socially and environmentally sensitive business model and corporate social responsibility policies.

This new business approach entails action on several levels: the rethinking of corporate reporting requirements; the customization of global, regional and national legislation; the consolidation of consumer associations, building their advocacy capacities; and the cultivation of firmer business integrity at every level. Therefore, the private sector should be proactive in leading its own renovation through an active dialogue with public sector and civil society organizations. This pro-activeness will also support in addressing the trust challenge raised by civil society networks regarding private sector engagement with the development policy agenda.

In addition, corporations increasingly comprehend the risks to long-term wealth if poverty and marginalization are not appropriately analysed and if economic development structures do not offer inclusiveness throughout the supply chains. The participation by numerous corporations and business in the formulation of the post-2015 development agenda demonstrates that the private sector is certainly cooperating to support the changes required to address these challenges.

The involvement of the private sector towards a new responsible method of doing business is crucial for sustainable and equitable development. Sustainable business plans show that it is not only the best way to proceed, it is necessary for business itself.

Notwithstanding, the private sector must comprehend that its participation in MSPs and the potential influence in policy-making are under strict and constant examination. Allegations of self-serving agendas are a cost for society, and are on occasion legitimate accusations. This definitely provides a robust reason to emphasize the importance of a neutral convener, able to harmonize stakeholders' interests.

In terms of facilitation, there is a business case for precompetitive cooperation, referring to innovation. The WBF gathers a mass of different partners to facilitate business-enabling environments. There is a need to create win-win situations. In order to achieve this, the common factor to create effective PPP is the need for an effective neutral convener. This facilitates agreements between stakeholders, especially companies who are in real competition. The convener must be able to facilitate a decent debate where problems can be revealed, providing clear data in order to set priorities of common interests.

A common debate between different actors can place company and government representatives outside their comfort zone. This situation requires strategies and relationships that prove to be mutually beneficial and reinforcing to all parties involved. The convener must also create individual agendas for every actor in order to facilitate an active contribution from members, and subsequently include these activities in the MSP's agenda.

The major influence that the private sector exerts over global food supply chains has to be analysed, including its expanding buying power and its dual role as both buyer

and provider for the end consumer. Indeed, retailers have become brands in their own right, with offerings ranging from discounting to premium labels across a huge range of categories. Nevertheless, the ecological and social standards for these brands vary greatly and often provide limited navigation for consumers on responsible choices. Increasing the transparency of supermarket supply chains enables fair sustainable production and consumption patterns with the recognition of best performances. Besides, brand reputation is being analysed on a day-to-day basis and is reflected in stock values. In this respect, companies need to reduce any potential threat of a bad reputation (the hero to zero effect).

The WBF facilitates the necessary synergies among the private sector, public sector and civil society organizations to complement each other in their processes to improve sustainable markets.

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What might an “agroecological” food system look like?

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ABSTRACT

Through its international and regional symposia, FAO has recognized the important role of agroecological production systems in the development of sustainable food systems. However, there is little understanding of how agroecologically produced crops become marketable products that are recognized by consumers for their agroecological qualities. In 2015, FAO and the Institut National de la Recherche Agronomique (INRA) conducted a qualitative survey with producers, consumers and intermediaries from 12 countries (Benin, Bolivia, Brazil, Chile, China, Colombia, Ecuador, France, Kazakhstan, Mozambique, Namibia and Uganda) to gain insights into this question. Through this study, we identified a typology of markets that are based on different levels of interaction between actors in a food system, the inclusiveness of the business model, the number of times the product changes hands, the fairness of prices, the means of quality communication and the identification of quality attributes themselves. In this paper, we present the results of this study by explaining these typologies of “agroecological” markets in developing countries.

INTRODUCTION

The FAO symposium on Agroecology in 2014 highlighted the importance of agroecological practices in the development of sustainable food systems, particularly for its contributions to the sustainability of family and traditional farming systems. Specifically, one of the conclusions was that “the ecological foundation and food system focus of agroecology provides an action-oriented approach for simultaneously developing alternative food systems, while transforming the current industrial model” (FAO, 2015a). If we are interested in pursuing this possible future model for sustainable food systems, we must be able to identify in practice what an “agroecological” food system might look like. Providing insights into this question is the purpose of this paper.

The first task is to provide a definition for an “agroecological food system”, which does not appear in the literature and is only emerging in practices around the world. The most well-known food system for agroecologically produced crops is referred to as organic agriculture (FAO, 1999). Organic agriculture has become a relatively stable term that is increasingly recognized around the world, with both positive and negative connotations (Freyer and Bingen, 2014). What began as a number of isolated experiments in the 1920s is

found today in 110 countries where there are active or draft organic regulations and at least 121 private organic standards (UNCTAD/FAO/IFOAM, 2012). These standards, and the certification and labelling systems that have been developed to enforce them (Fouilleux and Loconto, 2016), have contributed to the creation of national, regional and global markets for organic products. For instance, the State of Sustainability Initiative (SSI) estimates that there is a total production value of USD 50.3 billion across a range of standards for sustainable commodities in agriculture, forestry and fisheries (Potts *et al.*, 2014). The value of the global market for certified organic products alone reached USD 80 billion in 2014 (Willer and Lernoud, 2016), but this number captures only those products in consumer markets that are officially recognized as organic through public and private systems of standards, certifications, accreditations and labels.

Significant critiques of a dilution of agroecological principles as they have been interpreted in public organic standards and large-scale commercial organic farming (Darnhofer *et al.*, 2010; Gibbon, 2008; Jaffee and Howard, 2009) demonstrate that if we are to examine markets for products that come from production following agroecological principles, we cannot limit ourselves to only those markets that trade “organic” products. Moreover, organic third-party certification is not the only way to value the products and services from agroecological production. Moreover, it is probably not the method that is most adapted to agroecological food systems that rely upon small-scale production (FAO, 2014a). The value of agroecological products can be determined through a range of activities, particularly through the creation of a diversity of market channels through which produce can move from producers to consumers. Specifically, we need to look at the diversity of markets that are being built from the bottom up in order to capture the variety of ways through which agroecology is becoming commercialized in line with, or separately from, organic.

This line of research fills an important data gap in our understanding of transitions to agroecology-based food systems as there are currently not enough systematic studies on the role of markets in facilitating the creation of sustainable food systems within developing countries. In order to understand the extent to which food systems can become sustainable, and how markets can become beneficial to small-scale producers and family farmers and can promote food security, we must first know what the different food systems look like. The purpose of this paper is therefore to summarize the main results of the exploratory study undertaken by the Institut National de la Recherche Agronomique (INRA) and FAO to examine how those products that come from agroecological cultivation are being valued in markets.

STUDY METHODOLOGY

We relied upon perception data to gather information about how different actors in the food systems that we observed were actively constructing these systems through processes of identifying agroecological practices and assigning a value to the products of those practices. Since an “agroecological food system” was not a term that is commonly used in practice, and thus was not a model that could be tested, we adopted an inductive methodology that explored how markets are created. This study used a case study method (Yin, 1984) in order

to collect systematic evidence from multiple case studies. This approach permitted a meta-analysis of the opportunities and challenges of creating agroecology-based food systems across a range of diverse cases. These types of data enabled the following research question to be asked: are there markets for “agroecological” products and what forms to they take.

To answer this question we investigated the relationships between markets and agroecology by selecting six agroecological case studies that had the most developed market data in a previous study (FAO, 2016) and by adding six(6) new case studies of “agroecology-based food systems” that are purposively used to expand the diversity of situations (production systems, market practices, geographic distribution) and to develop an understanding of the sustainability of these systems (based on cultural, economic, environmental and social elements).

We conducted key informant interviews with producers (average $n=7$ per case), consumers (average $n=7$ per case) and intermediaries (average $n=5$ per case) in each initiative ($n=221$, 78 percent completed, an average of 18 per case) were conducted by the authors, or by local consultants who were familiar with the initiatives, using a structured questionnaire with closed and open ended responses. In eight cases, focus groups (Morgan, 1997) were used to facilitate discussions among consumers and farmers. The average age of interviewees was 46 years of age and 64 percent of respondents were female. On average, the respondents were of middle income compared with others in their community, but there was a rather higher level of education (university level) among the producers, intermediaries and consumers. On average, 54 percent of the daily food intake for those people who were interviewed consisted of agroecological products that come from within their initiatives.

The data were analysed using a mix of quantitative and qualitative methods (Creswell, 1994). We produced descriptive and inferential statistics (using Excel® and SPSS® software) to analyze the closed response questions to market channels, business models, prices and perceptions of sustainability. On the open ended responses, lexical analysis (using IRaMuTeQ software) was used for the analysis of similarity, co-occurrence of words and it was also used to present the results in a visual form of word cloud (Reinert, 1983). The lexical analysis allowed us to analyse the relationships between the words in the respondents’ descriptions of agroecology, quality and strategies. This allowed the authors to identify key trends in how markets are forming for “agroecological products”. We triangulated these forms of data with actor-network maps for each initiative, based on the value chain actor categorization used in previous FAO work (FAO, 2014b, 2016). This analytical method allowed us to create market typologies based on the role of intermediaries in facilitating flows of resources and values (finance, knowledge/information, commercial transactions, culture/values, control/surveillance, political authority) within each initiative.

RESULTS

We consider the creation of markets through the following five entry points (i.e. market channels, business models, product value, perception of sustainability of the system and possibilities for scaling-up). We summarize here the results from the study according to these five aspects of market construction.

Diversifying markets as a key strategy

Market channels can refer both to how farmers source the inputs they need to grow food sustainably and how they then sell the excess food that they produce. These channels do not necessarily have to be “market” exchanges in the classic sense of exchanging goods for money, but can also refer to other provisioning systems such as sharing or gift economies. Therefore, we take a holistic notion of market channels to try to capture the diversity of ways that products circulate within agroecological farming systems. Specifically, we solicited information about volumes and sales of products that pass through each channel. We asked about the prioritization of specific channels and the perceived benefits that each provide to consumers, intermediaries and producers.

Input market channels were primarily three: own production, local farmers and local supplier shops. The dominance of procuring inputs locally was justified by the cost reductions in the production process and the reliability of purchasing from trusted local actors.

We were able to identify that about 45 percent of the produce that is farmed agroecologically is being exchanged through channels that could be called agroecological (Figure 1). We use this term because respondents reported that this produce was either labelled or communicated to buyers as having ‘agroecological’ qualities.

From Figure 1, we see that the Songhai Centre in Benin is the most advanced, with 92 percent of their products being sold through Songhai’s own agroecological channels. The Akmola Traditional Presidium in Kazakhstan has the smallest proportion of their sales passing through agroecological channels (24 percent), but they also make use of non-monetary exchanges and self-provisioning which also provide channels for preserving the agroecological identity of their food. Self-provisioning remains a very important component of farmers’ marketing strategies (about 15 percent), which ensures that the farmers themselves are the very first consumers of agroecological food. The Ecuador initiative sells the largest proportion of its products through conventional channels (57 percent) because of an arrangement that was negotiated between the producer cooperative, two consumer cooperatives and the wholesale market. In this arrangement the initiative was able to purchase and sell products for their box scheme using the wholesale market service, but at a renegotiated price that was considered fair for both producers and consumers. This negotiated price takes into consideration the higher value and costs of agroecological production, so even though the products move through conventional channels, there is some acknowledgement of the agroecological production practices that are used.

For products, we found an amazing amount of diversity. We identified 20 different market channels in addition to informal barter/exchange and the self-consumption of products by the farmers across the cases. On average, there were 8.3 channels per case and the farmers in all of the initiatives also consumed a portion of what they grew. The most important market channels were: Direct sales and on-farm sales, Farmers’ markets & Ecofairs, Open air markets and restaurants/hotels (Figure 2).

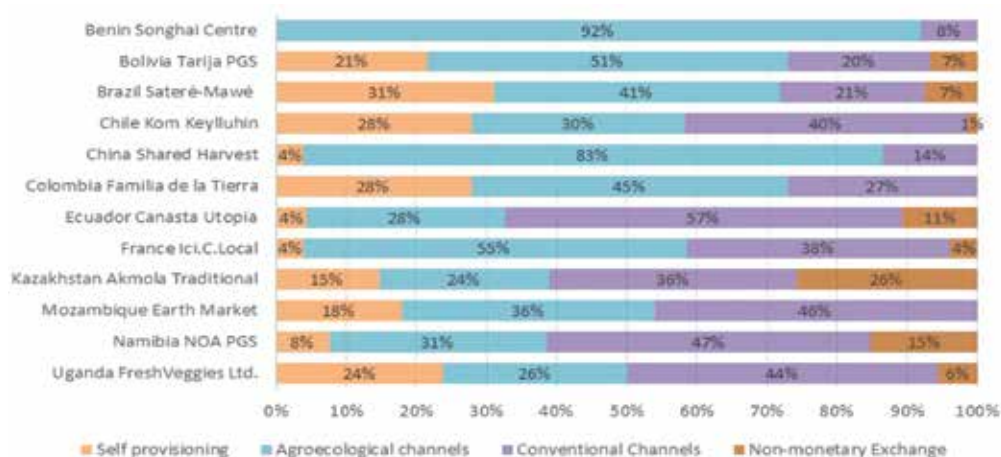


Figure 1. Where does the agroecologically produced food go?

Source: FAO (forthcoming 2017).

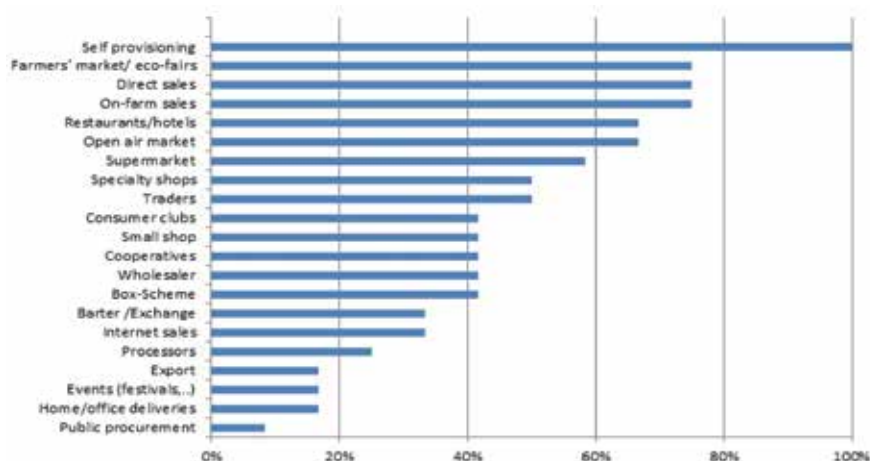


Figure 2. Diversity of market channels for 'agroecological' products: How do they create markets?

Source: FAO (forthcoming 2017).

The biggest challenges to accessing markets reported by producers and intermediaries were logistics and lack of consumer awareness both about where to find agroecological products and about why agroecological products should be consumed (specifically in terms of what the agroecological qualities were). The logistics concerns were linked to inconsistencies in production and challenges in product placing, often due to poor transport conditions and a lack of adequate post-harvest and processing infrastructure close to the areas of production. In terms of consumer awareness, most of the initiatives reported that intermediaries and consumers lacked information about agroecological products and production practices and were highly influenced by untrustworthy or incorrect information about the safety and price of agroecological products, mostly linked with labelled organic products.

Community-based business models

To understand how the organizational arrangements provide opportunities to construct different forms of markets, we focused on the types of business models set up by each initiative. We found that all initiatives had the community embeddedness as one of the principal objectives. This means that each food system initiative fitted its objectives to the specific needs of the community and the socio-cultural context was taken into account in the development of the initiatives' way of operating. The organizational forms most common across the cases were those that included producers, intermediaries and consumers directly in the governance of the initiative. Most initiatives were inclusive of anyone who wanted to join; only a few had the specific objective of including marginalized people. Finally, financial independence was a goal of all of the initiatives, but only 46 percent of the cases have reached financial autonomy of the entirety of their operations. On this point, it is important to note that the commercial side of operations is generally covered through product sales, but the extra services that are provided by the key intermediaries are often funded through public, research or donor funds.

The value chains are rather short (with an average of two to three links), even in export markets where direct contact with importers was common and despite the geographic distance. Oral agreements were the most common form of engagement between actors and, on average, there are between four and five different actors working together in network formations (nonhierarchical relationships and each operating within their own organizational structure) and agroecological products change hands about two times in these networks. Based on these criteria, we can classify the supply chains across the 12 initiatives as being "short food supply chains" (Chiffoleau, 2012; Chiffoleau and Prevost, 2012; Goodman, *et al.*, 2012; Renting, *et al.*, 2003).

Valuing products

We ascertained how quality is determined and how price is calculated and negotiated between the different actors. We wanted to understand how producers, consumers and intermediaries perceive the value of the products and how they allocate a monetary measure (or not) to that value. We adopted a broad definition of quality that can include organoleptic, credence (including social and cultural) or nutritional attributes of the products. These aspects are not always captured in the price of a product and may be valued through alternative channels. Therefore, we gathered information about how quality and price are communicated between producers and consumers, which can take place in common spaces such as during monthly fairs, through advertising via the Internet or cell phones, captured by brand recognition or in a collective label, or by word of mouth through traders or other intermediaries. As a result, qualitative and price data were collected. Unfortunately, it was not possible to collect reliable price data for all of the products in all of the cases. Therefore, we focused on understanding the perception of the fairness of the prices that were received by producers and intermediaries and also paid by consumers and intermediaries.

The most common responses for the desired qualities for agroecological products were related to rather typical organoleptic and visual quality attributes: taste, freshness, good quality, size and appearance. We also see cleanliness and organic are important attributes. Packing was also mentioned. Ecological and agroecological as a clearly defined quality are less prevalent.

We found that knowledge about the agroecological qualities through direct contact between trusted actors (producers, consumers and intermediaries) can, in some cases, override the dominant preferences for classic quality attributes. This is because the communication of “agroecological value” is done mostly through direct communication and contact between consumers and producers. For example, in Ecuador consumers visit the farms to learn about production practices and to meet the farmers. In Chile, restaurants prepare traditional food with agroecological products purchased directly from farmers and explain these qualities directly to consumers.

However, branding and labeling are also very important for a number of cases. For example, in Benin, the Internet is used to advertise their products as being high quality, natural and organic – which they link to their own brand and is also communicated through on package labels. In France, a different kind of label is used at the community market whereby colours differentiate the distance travelled by the products – thus allowing consumers to choose to support shorter or longer value chains.

Overall, the prices were considered to be fair by all actors in the system (Figure 3). The actors in Kazakhstan and Bolivia felt that their prices were the least fair, but in both cases they felt that the system for setting prices was fair. When we looked at whether or not the consumers are paying more for agroecological products and whether or not they are willing to pay more, we see that Bolivia is not paying a higher price for their products, but they are willing to pay more, which means that the consumers do not think that they are paying as much as they should for agroecological products (which is in line with their feeling about the fairness of the price, which we can interpret to mean that it



Figure 3. How fair are agroecological food prices?

Source: FAO (forthcoming 2017).

is not fair because it is not high enough). On the other hand, Kazakhstan is not paying a higher price, but the consumers feel that they should be paying less. This also reflects the unfairness of their prices from the last table, but in this case the unfairness comes from prices that are too high.

Overall, the consumers that were interviewed in these case studies seem to be insensitive to price (except for Kazakhstan and Uganda) – or at least they placed a lower priority on the price of the product when determining quality. This finding is in line with the literature which suggests that ethical consumers are less price-sensitive than others (Arnot *et al.*, 2006). Often, this is tied to their relatively higher socio-economic status. However, our interviewees declared themselves to be mostly of middle income compared with the average incomes where they live; which offers an interesting avenue for future research.

Sustainability of market networks

As a way to understand the sustainability of “agroecological food systems”, we started with understanding how those actors who are involved in the initiative perceive the sustainability of what they are doing. We adapted the self-assessment developed by the Laboratory of the Social and Solidarity Economy. This assessment holds the normative assumption that a sustainable food system is based on four principles : (i) the creation of social ties (trust, solidarity and reciprocity) and cooperation; (ii) equity in financial exchanges and efficiency in operations; (iii) a participatory approach to decision-making; and (iv) a ‘learning-by-doing’ logic where interactions between participants creates greater common understanding and identity (LABO ESS, 2015).

From this perspective, we have characterized the initiatives under review as what van der Ploeg and colleagues (Hebinck, Schneider and van der Ploeg, 2014; van der Ploeg, Jingzhong and Schneider, 2012) have identified as “nested” markets, which are those markets that are formed within existing dominant markets as a response to a variety of market failures. They are the result of social struggles and mobilize the specificities of place and networks to create spaces where quality products receiving premium prices can be exchanged.

Then we examined the different roles of the dominant intermediary (that actor who was the most influential in building the local network that supported the market). We found that we could identify differences in the nested markets based on the extent of the diversity of this actor’s roles in supporting the network that was built to support market exchanges and the level of their participation in the market transactions (Table 1). For example, in Ecuador, we found that the intermediary (Canasta Utopia) provided only a market-making service in its network – that of organizing the box-scheme, which is the core market exchange of the network. Here an interactive market network was created to facilitate the exchange of products that could be identified as agroecological. However, in China, we found that the intermediary (Shared Harvest) directly organized the market exchanges, but also organized the production, training services, a restaurant and educational and research programmes. In this market network, socio-cultural exchanges were also part of the value of the market.

When we look at the perceptions of sustainability from intermediaries, producers and consumers according to these different typologies – we see that, generally, there is coherence

Table 1: Nested Market Networks for Agroecology

DIVERSITY OF INTERMEDIARY MARKET MAKING ACTIVITIES		
PARTICIPATION IN MARKET EXCHANGES		
	LOW	HIGH
	Information-rich market networks <ul style="list-style-type: none"> • The main intermediary function is to share information between market actors (quality control system), but no market exchange • Product specialization • Direct sales as the core site of interaction and value creation Examples : Bolivia, Kazakhstan, Namibia	Diversified market networks <ul style="list-style-type: none"> • Multi functional intermediary provide services that add value among market actors (some trading) but do not run the consumer market • Product specialization and innovation • Traders as the core site of interaction and value creation Examples : Uganda, Brazil, Colombia
	Interactive market networks <ul style="list-style-type: none"> • The main intermediary function is to facilitate the market exchange • Product diversification • Farmers’ market as the core site of interaction and value creation Examples: Ecuador, France, Mozambique	Socio-cultural market networks <ul style="list-style-type: none"> • Multi functional (market, knowledge, education, services, etc.) intermediaries who own/run their own markets • Product diversification • On-farm shops as the core site of interaction and value creation Examples : Benin, Chile, China

Source: FAO (forthcoming 2017).

between the responses (Figure 4), except for the information-rich markets, where the consumers are much less positive about the environmental, economic and cultural sustainability of this type of network. This is very interesting because it is the only network where the intermediaries do not have a direct role in the marketing of products – which is an important point for future research on the role of intermediaries within transitions to sustainable food systems.

Scaling up

There is a temporal aspect to sustainability, which means that a system must be able to persist over time. One of the questions often asked is how does an “agroecological food system” emerge and evolve over time? Another question relates to what kinds of support structures are required in order to transition existing food systems towards “agroecological food systems”? These questions refer to the scaling up (or out) of “agroecological food systems” via horizontal or vertical expansion (see Callon, 1998; Hermans, *et al.*, 2013).

Each case demonstrated different changes in their operations over time and there are clearly opportunities for changing the scale of their operations in the future. We can summarize the proposals in two ways: the first is through a scaling-up approach and the second is what has been referred to in the literature as scaling out. Scaling up was referred to as the changing of the scale of influence of the initiative – often in terms of vertically expanding the reach of the core intermediary. For example: the case from Namibia proposes a model of mediated growth and diversification of markets. One producer claimed:

We should not be focusing on superspar [local supermarket], but focusing on the other markets ...have to be careful that we don't grow grow grow (and follow the trend in the economic world) so that our quality and our human relations go down.

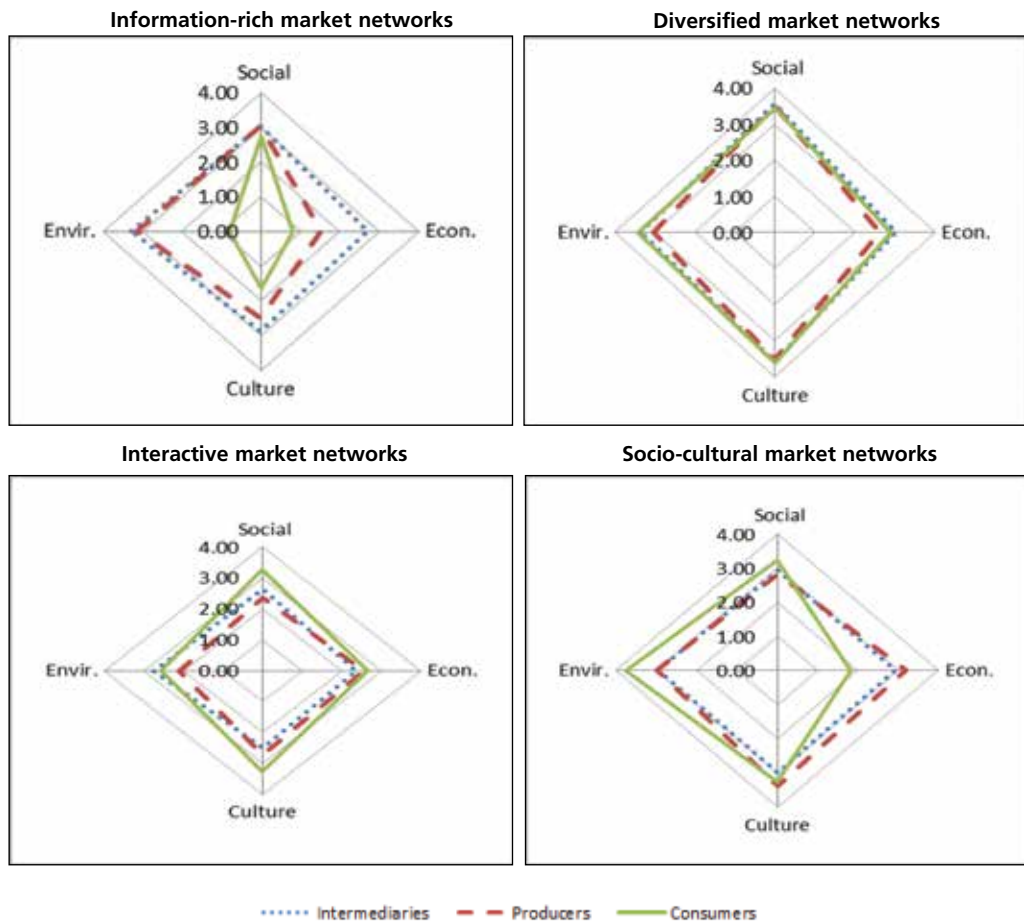


Figure 4. Perceptions of the sustainability of the different nested market networks

Source: FAO (forthcoming 2017).

Scaling out is a term that has been used more recently in farming systems research and refers to a horizontal expansion of a technology or idea, rather than a vertical size increase. In Uganda, the scaling up strategy is on growth in local clusters around the country that can then be connected through logistics systems. An intermediary explained that

Since we have four different geographical locations ..., through the steering committee of directors, we should support the clusters to grow to that tune (up to 800 members). (...) This structure represents replication of a business idea to other regions without compromising the autonomy of producers to own their operations.

In general, the most common opportunity for scaling up is increasing local, regional and national recognition of the initiatives. Increased visibility is helping to share these experiences beyond the borders of their communities. Diversification of markets, in terms of both new sales outlets and new products, is actively being pursued. The type of support that is needed is fairly common across all cases: there is a need for financial

support. There is an interest in specific certification schemes for agroecological products as a means to differentiate these; access to agroecological technologies and training in these practices are still needed. Political support through the recognition of agroecology and its existing markets is important for scaling up – particularly in Bolivia, Colombia and Mozambique. Finally, there is a need for internal commitments by members to continue their participation in the initiative and local-level collaboration between private and public actors is fundamental to changing the scale of these initiatives.

CONCLUSIONS

We do find evidence that the concept of an “agroecological product” is emerging, but the term “agroecology” is not an evident quality attribute sought in markets. This product is traded in short food supply chains at fair prices within initiatives that are mostly sustainable with respect to economic, environmental, cultural and social concerns. Producers and intermediaries perceive the initiatives to be more economically sustainable than consumers do, and intermediaries see the greatest potential for the environmental sustainability of these networks.

These markets are dynamic and the actors are strategic in how they are positioning their products and how they are creating a value for them in their markets. All initiatives use some form of informal or formal control and those who use on-product labels are mostly using adaptations of participatory guarantee systems to ensure the use of agroecological practices. The more inclusive initiatives are building on existing social networks, but are also expanding, as we found significant response rates related to the role of the initiative as creating a social space for collaboration among actors who traditionally do not socialize. This points to relative network stability for the majority of the cases, even though financial autonomy is not fully achieved. There is significant potential for changing the scale of these initiatives, both in individual size and in their collective reach based on a declared, but untapped consumer demand.

Gliessman (in FAO, 2015b) argues that there are five levels of passage in a stepwise transition towards sustainable food systems. The first three focus on the farm level with changes that must be made progressively towards more ecological agricultural practices – i.e. creating eco-efficiencies in industrial/conventional practices (level 1); substitute industrial/conventional inputs and practices (level 2); redesign the agroecosystem so that it functions on the basis of a new set of ecological processes (level 3) – while the last two deal with food system changes at local and national levels (level 4) and at a global scale (level 5). Specifically, level four of a transition to a sustainable food system is the re-establishment of a more direct connection between those who grow the food and those who consume it. We see evidence of this emerging in 12 different countries. Specifically, we have found evidence of an important role for consumers who are directly influencing the way products are marketed and a correspondingly increased responsibility being taken by producers to develop their own marketing strategies. The construction of nested market networks illustrate that products are not the only goods being valued in these spaces, but cultural traditions, ideas, visions, and knowledge are also being exchanged. Community

embeddedness is a core element of these markets, which is reinforced by the valuing of direct contact, interpersonal trust and the proximity of actors within the networks. These exploratory results point to a need to take the lessons learned from this research and develop broader surveys that can collect systematic and comparable data across a variety of agroecological, socio-cultural, geo-political and economic food systems.

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What types of markets to support agroecology? Reflections from the FAO agroecology symposia

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ABSTRACT

Since 2014, FAO has opened a neutral space of dialogue to discuss agroecology at global and regional levels. The need to consider the market factors that could facilitate the adoption of agroecological practices emerged during these discussions. Food distribution, sales, marketing and market supply chain relationships are important drivers of farmers' decisions and actions. They need to be considered and addressed in any attempt to scale up or broaden the adoption of agroecological practices. This paper summarizes the main points related to markets for products of agroecology that have emerged out of the discussions organized by FAO these two last years. It first recalls the main characteristics of agroecology and the increasing interest for it, both from civil society and, more recently, from governments. It then identifies specificities of markets for products from agroecological systems, potential challenges and opportunities. It focuses on four institutional and organizational mechanisms that support markets for agroecology: strengthened producers' organizations, public procurement, Participatory Guarantee Systems and community-supported agriculture. The paper concludes with the importance of pluridisciplinary research to better understand and strengthen the links between agroecological production systems and market-related mechanisms.

INTRODUCTION

Since 2014, FAO has opened a neutral space of dialogue to discuss agroecology at global and regional levels. The need to consider the market factors that could facilitate the adoption of agroecological practices emerged during these discussions. The roles of food distribution, sales, marketing and market supply chain relationships are often left out of analysts' considerations of agroecology and sustainable agriculture, but must be addressed in any attempt to scale up or broaden the adoption of agroecological practices. Increasing the adoption of agroecological practices to produce nutritious food requires addressing market factors in food systems, which influence farmers' decisions and actions.

This paper summarizes the main points of the discussions on market-related aspects of agroecology that have taken place over the last two years within FAO. These include the International Symposium on Agroecology for Food Security and Nutrition held in Rome

in September 2014 (FAO, 2015a), and three regional meetings in Latin America and the Caribbean, sub-Saharan Africa and Asia and the Pacific, throughout 2015 (FAO 2015b, 2016a, 2016b). These meetings brought together a range of actors engaged in agroecology and enabled the building of the evidence base on successful practices, research and policies from around the world. They led to recommendations negotiated by stakeholders from governments, civil society, research and the private sector. In addition, a side event on agroecology was organized on the occasion of the 154th FAO Council (speeches and presentations are available on the FAO Web site),¹ as well as the technical seminar “*What markets support agroecology and sustainable food production systems?*” (FAO, 2016a), both held in FAO headquarters in June 2016. This paper seeks to examine the market-related issues that have been presented in the fora to obtain a deeper understanding of what it would entail to advance agroecology. It focuses on markets for agroecological produce and does not consider input markets, land markets, self-provisioning and exchanges.

It first recalls the main characteristics of agroecology and the increasing interest for it, both from civil society and, more recently, from governments. It then identifies specificities of markets for products from agroecological systems, potential challenges and opportunities. It focuses on four institutional and organizational mechanisms that are particularly promising: strengthened producers’ organizations, public procurement, Participatory Guarantee Systems and community-supported agriculture. The paper concludes with the importance of pluridisciplinary research to better understand and strengthen the links between agroecological production systems and market-related mechanisms.

AGROECOLOGY: FROM SCIENCE AND SOCIAL MOVEMENTS TO POLICIES

The intensive use of external inputs has long been recognized for generating a wide variety of negative externalities, causing environmental, economic and social harm (Gliessman, 2014). Conventional agriculture, which increases yields by simplifying landscapes (FAO/CBD, 2016), exposes farmers – and food systems more broadly – to high levels of social, economic and environmental risks (IPES-Food, 2016). In response to these negative impacts, agroecological practices aim at substituting the services conventionally provided by external agricultural inputs with ecosystem services, leveraging the synergistic interactions among living organisms to increase the overall sustainability of farming activities. Agroecology recognizes, valorizes and preserves the complexity of social-ecological systems and seeks context-based solutions that build upon farmers’ knowledge and local cultures. This approach, which is extremely knowledge-intensive, uses ecological science to foresee yield-limiting factors in order to eliminating the root causes of the problems that affect conventional agriculture.

The use of the term agroecology emerged in the scientific community in the 1920s but greatly expanded starting from the 1980s, when it became recognized as a specific conceptual framework for the study of agroecosystems, partly in reaction to the negative environmental impacts of industrial-scale farming, the growing injustices of industrial agriculture and the negative consequences on hunger and poverty (Wezel *et al.*, 2009;

¹ <http://www.fao.org/about/meetings/council/cl154/cl154-side-events/Agroecology4foodsecurity/en/>

Wezel and Soldat, 2009). Many farmers' organizations and civil society organizations embraced this approach and popularized the concept of agroecology beyond academia. Over time, a number of countries have started to adopt policies and programmes on agroecology including Brazil (Cardoso and Mendes, 2015), Cuba (Rosset *et al.*, 2011) and France (MAAF, 2013). Others support related approaches, such as the Africa Union's Ecological Organic Agriculture Initiative (FAO, 2016b) and China's National Agriculture Sustainable Development Plan (2015–2030).²

FAO responded to this growing interest in agroecology among farmers' organizations, scientists and governments by organizing a series of international, regional and national multistakeholder symposia on agroecology for food security and nutrition. The International Symposium on Agroecology for Food Security and Nutrition held in Rome in September 2014 had the participation of Ministers of Agriculture from France, Senegal, Brazil, Costa Rica, Japan and the European Commission, and was organized with the support of France, the Swiss Development Cooperation and the Foreign Office of Agriculture of Switzerland. In addition, 25 percent of participants were from civil society. These symposia have enabled a greater sharing of experiences from different parts of the world, and promoted coordinated action at global level to support countries to adopt agroecological approaches.

MAIN FEATURES OF MARKETS FOR AGROECOLOGY: BIODIVERSITY AND LOCAL FOOD SYSTEMS

It is clear that agroecological producers do not “fit” easily into existing formal markets, at least in part due to issues related to biodiversity. Empirical evidence shows that the growing integration into formal global food systems/markets creates increasingly rigorous and specific requirements and obligations for producers' production practices, as well as growing competition among producers to meet such demands. Producers are generally obligated by contracts or formal agreements. These requirements include crop variety (including specified seeds) and volume of crops in specified time periods (Thrupp, Colozza and Choptiany, 2016). In contrast, for example, the agroecological practice of cultivating different crops in mixtures (cultivars of the same species or mixtures of different species) has been shown to be beneficial for ecosystem services (stability of performance, resistance to diseases, etc.), but mixtures can be challenging to market in formal market channels due to standards that limit variability (Wade, 2015). Based on experiences in supporting farmer organizations for the marketing of agroforestry products in ten countries, the FAO Forest and Farm Facility (see Box 1) notes that markets that are developed as vertical value chains for single products do not resonate with diversified production systems such as agroecology/agroforestry and, in general, with family farming systems.

The need to ensure markets adapted to biodiverse products is not surprising. Agroecology increases biodiversity across space and time, including both intraspecific and interspecific diversity in crops (Nicholls and Altieri, 2015), and also helps conserve uncultivated

² Speech by Mr Jianmin Xie, Deputy Permanent Representative, Counsellor, Permanent Representation of China to FAO, on the occasion of the Side Event on Agroecology for Food Security and Nutrition, held on 2 June 2016, during the 154th FAO Council: www.fao.org/about/meetings/council/cl154/cl154-side-events/Agroecology4foodsecurity/en/

biodiversity in surrounding landscapes (De Clerck *et al.*, 2015). Consequently, even a single farm can have a wealth of different products to offer to the market. In Argentina, for example, the agroecological farm *Naturaleza Viva* produces a wide range of foods, both processed and unprocessed: sunflower seeds, sunflower oil, wheat, whole wheat flour, linseed and linseed oil, beef, pork, milk, cheese, jams, juices and fruit in syrup, honey, chickens and a variety of medicinal plants (Venica and Kleiner, 2015).

Markets for agroecology can take diverse forms and display a range of important features. The discussions carried in the FAO fora particularly focused on two key features: the importance of biodiverse agroecological production and marketing through local food systems. These two features emerged from the cases cited in both the international and regional symposia on agroecology, as well as the FAO seminar on markets for agroecology (numerous examples were cited that are referred to below). Many of the cases feature both biodiverse products and marketing through local food systems, indicating that there might be important linkages between these two features. The diversification of products, which generally involves local and cultural traditions, lends itself to market configurations based on short value chains, which favour the emergence of local networks made of strong social and economic relationships (FAO, 2016a). The cases reported through the FAO meetings uncover some of the ways in which farmers are succeeding to bring their biodiverse products to markets, which markets they are accessing, and what goods they are selling.

Looking specifically at the recommendations of the FAO multistakeholder symposia on agroecology, they all placed great emphasis on the local dimension of agroecology including, in some cases, an explicit reference to local markets. For example, one of the recommendations of the International Symposium is to encourage short commercialization circuits and local food systems. The Asia and the Pacific symposium participants called for government support to reorient markets to make them work for small-scale food producers. In Latin America and the Caribbean, participants called for mechanisms that enable the reciprocity of participatory guarantee systems among the countries of the Latin American region by promoting the link between producers and consumers. In Africa, symposium participants called for policies that favour local food production and recommended taking value chains and market development into account in innovations in order to make agroecology more attractive, especially to youth. The symposia recommendations did not raise the issue of biodiversity in relation directly to markets, but all of them certainly did underline the importance of biodiversity to agroecology, including the role of farmers and other small-scale food producers in developing this biodiversity as well as the necessity of ensuring their rights to access this biodiversity. First of all, it should be noted that the large majority of farmers in the global south sell to informal markets, such as farmers' markets, street vendors and other non-formalized exchanges. Products enter a network of mobile local markets, fairs and alternative stores, which connect a variety of producers, intermediaries and processors (Thrupp, Colozza and Choptiany, 2016). For example, 70 percent of fruits and vegetable in Chile are grown by smallholder farmers and sold to street vendors (Thrupp, Colozza and Choptiany, 2015). In Mexico, the Chinampa and the Milpa-Solar systems, two peri-urban pre-Columbian agricultural heritage systems characterized by agroecological practices and diversified production, account for

30 percent of the food consumed in Mexico City (FAO, 2016a). In these settings transitioning towards agroecology may not necessarily imply a conversion from conventional global/export markets to shorter local value chains, but would rather mean strengthening and making more efficient pre-existing socio-economic networks, which are already suited to agroecological production.

Many agroecological producers have invested their efforts in creating new markets through local networks that respond to and valorize the complexity of diverse farming systems (FAO/INRA, 2016). A recent review of 15 case studies of markets for sustainable agriculture found that 87 percent of the cases relied on short value chains as a marketing outlet, 60 percent on domestic markets (supermarkets, wholesalers and other distributors), 47 percent on long value chains (particularly for tea, cocoa and rice), 20 percent on reproduction (own consumption and farm-saved seed) and 20 percent on the hospitality sector (FAO/INRA, 2016).

In Benin, the development approach fostered by the Songhai Centre³ allowed for the creation of a solid regional network of local hubs for sustainable agriculture. On-farm diversified production is designed so that it facilitates exchanges, synergy, complementarity and networking among farms and enterprises, for example through processing, recycling and up-cycling. This approach allows producing 90 percent of the input needed locally, creating a great competitive advantage, which allows keeping prices low while providing high-quality products. Products include vegetables and livestock products, but also processed fruit juice, honey, yoghurt and soaps. Food processing is done locally and products come with a label providing consumers with information such as ingredients, nutritional values, expiry date and contact details. Produce reaches a diversity of markets, buyers and distributors. It can be sold in on-farm shops, at central pick-up points in the city, or sold directly to the hospitality sector. Although Songhai Centre products are mainly destined for local markets, when local demand is satisfied products can find alternative channels, including neighbouring countries (Agossou *et al.*, 2016).

The Songhai model is an example of how agroecological principles can be applied beyond farming practices to create a synergic constellation of diversified enterprises.

A similar approach is the one adopted by the Namibian Organic Association, which encourages recycling the waste from one enterprise (e.g. chicken manure) as an input into another (e.g. compost making), which in turn is used by a third enterprise (e.g. vegetable production) (Smith and Barrow, 2016).

In Cambodia, a project aiming to link small-scale agroecological producers to markets relies on two distribution networks: one through wider local markets (8 wholesalers and 23 retailers) and one through short food supply chains (three restaurants, one canteen and one weekly local market). Farmers are organized into vegetable producer groups that collectively offer 43 different types of vegetables seven to eight months out of the year. The project works with 15 “local collectors” who link the groups to markets (Touch, 2015).

Markets that support biodiversity are not only those for food products. Other forms of supporting biodiversity through the market can be found, for example, in Trinidad and

³ <http://www.songhai.org/>

Tobago, where the development of agritourism, alongside local farmers' markets, has helped to diversify production (Waithe, 2016).

The economic stability and resilience of food systems adopting agroecology can be enhanced through a variety of combined institutional mechanisms aimed at ensuring shorter, inclusive and sustainable value chains. As described in the subsections below, numerous case studies presented during the FAO symposia and seminar evidenced how various institutional and organizational mechanisms favour the emergence and development of sustainable local agroecological systems. Four main institutional and organizational mechanisms are highlighted here, since they emerged most strongly in the recommendations of the symposia, and from the FAO experiences highlighted in the technical seminar, "*What markets support agroecology and sustainable production systems?*". In most cases, such mechanisms reach their potential when they involve different actors, institutions and initiatives – *inter alia* – through experiences related to public acquisition programmes, school feeding programmes, organizational models of group producers, Participatory Guarantee Systems and solidarity-based economies including community-supported agriculture (FAO, 2015a, 2015b, 2016a, 2016b). These mechanisms also tend to support the features of agroecological markets described above, namely biodiversity and local food systems.

STRENGTHENED PRODUCERS' ORGANIZATIONS

A consequence of developing agroecological interventions based on local ecological, social and economic contexts is that producers and their organizations come to play a central role in local innovation systems (Hainzelin, 2015). In general, producers' organizations play a crucial role in agroecology, including through the development of innovations, the diffusion of agroecological practices, and through engaging with markets to ensure better incomes for farmers. Producers' organizations and food aggregation hubs allow smaller producers to group together and gain access to resources otherwise inaccessible to single individuals (Thrupp, Colozza and Choptiany, 2015). FAO's experience in supporting farmer organizations through the Farm and Forest Facility (FFF) provides insights into the market-related obstacles faced by agroecological smallholder farmers (see Box 1).

Participants in the FAO agroecology symposium in Asia stressed the need to move to a holistic and inclusive approach for the development of agroecology, enhancing connections and partnerships between producers' organizations and other public and private actors. In relation to this, one of the recommendations of the symposium calls to "enhance the skills of farmers to better understand and use markets for income and expanded opportunities through organized cooperatives" (FAO, 2016c). Participants also stressed the need to encourage policy environments that protect the interests of small agricultural producers, ensuring that the sharing of risks and benefits between food producers and investors is equitable and inclusive (FAO, 2016c). In Latin America and the Caribbean, the important role of women in organizations of agroecological producers was stressed. One recommendation of the FAO symposium calls for the development of "specific policies which promote the productive organization of women [...] supporting their agroecological initiatives" (FAO, 2015b).

Box 1: Market-related obstacles faced by agroecological smallholder farmers

The FAO Forest and Farm Facility (FFF) implements a variety of initiatives aimed at promoting organizational models for linking agroecological-agroforestry producers to appropriate markets. The FFF has ten partner countries¹ in Africa, Asia and Latin America and the Caribbean and it supports apex organizations and collaborative efforts by forest and farm producer organizations at regional and international levels. An analysis of these projects has led to the identification of the following market-related obstacles faced by agroecological smallholder farmers, highlighting the need for strong producer organizations to overcome these obstacles. The obstacles are: (i) smallholders generally hold very limited negotiating power given that traders – including global brands – generally offer low prices, even for certified products; (ii) family farmers who depend on natural resources are often considered “illegal” or at least “informal”, which further weakens their ability to negotiate; (iii) the bureaucratic and legal burden is often unbearable and the process of certification generally is viable only for monoculture mainstream producers; (iv) in many cases, poorly organized groups are only permitted to trade the lower-value products, missing important opportunities for generating more income; (v) these barriers emerge in the context of, and often depend on, conditions of informal land tenure (which can hamper certification); (vi) markets are generally developed – and manifest themselves – as vertical single value chains; consequently, the optimization of a value chain is generally intended as the optimization of a single product through a single flow. Such an approach to markets, which is the dominant one, does not resonate with diversified production systems such as the agroecological and more in general family farming systems.

Source: FAO, 2016a.

¹ Bolivia, Gambia, Guatemala, Kenya, Liberia, Myanmar, Nepal, Nicaragua, Viet Nam and Zambia..

Producers’ organizations play a central role in sharing knowledge about agroecology and in supporting their members in the transition. Farmers organize their work collectively to support the agroecological transition, aggregate supply, grant quality, achieve higher fair prices, lower costs, restore the soil, increase productivity through integrated farming and diversify products, thus generating additional value (FAO, 2016a). By increasing producers’ level of organization, farmers rapidly expand their possibilities and are enabled to access various markets at higher prices. The Asian Farmers’ Association, for instance, has 12 million members and focuses on eliminating disparities in market prices and lack of pricing skills among producers. The Association works with the single biggest producer of organic rice, supporting the production of high-quality, healthy, red rice. This programme provided knowledge on collective marketing, supported the reduction of input costs through organic farming, and helped increase diversity on-farm by raising chickens along with rice (FAO, 2016c). The Viet Nam Farmers’ Union, with the support of FFF, was enabled to expand its activities to the forest sector, enriching the portfolio of most farms with non-timber-forest products and sustainably managed timber. Through a slow but steady scaling-

up process, they positioned themselves as a major supplier to the furniture market. Farmers received training in market analysis and development. FFF also supported the clustering of production. Through this approach cinnamon and tree growers formed an association and were able to achieve a 15 percent price increase. Within a short period of time farmers also expanded their operations to processing, obtaining an additional higher value (FAO, 2016a).

The FAO symposia stressed the importance of horizontal and participatory knowledge sharing and capacity building activities through producers' organizations as a way to ensure sustainable up-scaling of agroecological approaches. These dynamics are generally based on "producer to producer" exchanges and may be supported by governmental organizations aimed at training farmer associations to facilitate local business development, with complementary activities such as collection and transport. For example, since 2010, the Cambodian Institute for Research and Development (CIRD), GRET and the Siem Reap Provincial Department of Agriculture has been running a programme aimed at the development of sustainable agriculture for smallholder farmers, based on low external inputs and diversification of production. Targeting 2 000 farmers from 50 villages, the programme supports the setting-up of farmers' organizations and facilitates business development of local collectors without providing any direct financial support. Through this distribution pattern, local collectors are able to sell their products on a large scale. Provincial and district markets represent 97 percent of purchases, with increased demand for local agroecological products. Local collectors build trust with farmers, as they perform three functions: (i) provide advice on agroecological practices; (ii) collect and transport products to near-city markets; and (iii) share market and price information as regular traders (FAO, 2016c).

The FFF experience provides insights into the needs of agroecological farmers: (i) improved access to and provision of support services, technical information, business development and marketing; (ii) a shift from product-specific loans to loan mechanisms designed to support diversified production; (iii) improved local market access and infrastructure, for example by rendering processing more mobile and adaptable to multiple products; (iv) encouragement of basket value chains and multiproduct traders; (v) support for fairs and local events; (vi) support for certification strategies; (vii) support for local, territorial and regional branding, valorizing the local diversity; (ix) fostering of exchanges among producers; (x) consideration of the effects of the agroecological development pathway on the distribution of benefits, using distributional value – as opposed to profit maximization – as an efficiency criteria; and (xi) fostering of a multitier structure: one level with producers' organizations and the county level with clusters of lead products (these groups should be organized and represented on a national level).

Strong producers' organizations seem to be key for agroecological transitions, but given the complexity of the social processes inherent in organizing diverse and context-specific settings, further research on this topic is needed to support their wider development. These could include issues related to analysing the dynamics and roles of multiproduct traders with increased diversity across products and across seasons, as well as the innovations often promoted by producers' organizations in terms of the distribution of benefits and risks, with related impacts at social, economic and environmental levels.

PUBLIC PROCUREMENT PROGRAMMES

While many farmers worldwide are eager to transition to a more sustainable model, public policies play a key role in whether agroecology processes can achieve scale. Governments can use government procurement, credit, education, research, extension and other policy instruments to favour agroecological transformation and promote the creation of local adapted markets (Rosset, 2015).

All FAO agroecology symposia stressed the potential of public procurement policies to link agroecological systems to markets. The international symposium recommended to “encourage short commercialization circuits and local food systems, *inter alia*, through procurement policies” (FAO, 2015a). Participants at the symposium in Latin America and the Caribbean highlighted Brazil’s Food Purchase Programme as a mechanism to support agroecology through public policies (FAO, 2015b). Participants of the Asian and the Pacific Symposium recommended to “prioritize investments in smallholder food producers, reorient markets to make them work for small-scale food producers, including to strengthen and where needed creation of local markets and developing and implementing institutional food procurement policies oriented towards agroecological and local products” (FAO, 2016c). Likewise, the African symposium recommended to “develop and implement public procurement policies that favour agroecological and local food production as well as intensifying South–South cooperation on agroecology” (FAO, 2016b).

When implementing public procurement programmes (PPP) for food acquisition, governments address several objectives such as food system regulation (price regulation, strategic food reserves), catering for public employees, food access, promotion of nutritious food habits (school feeding), food aid, and nutritional programmes and interventions. These objectives can also be linked with other policy objectives such as environmental protection, social justice, etc. In these cases, the set of procurement criteria can be expanded and build upon principles that include food sovereignty, sustainability and social justice (FAO, 2016a). Integrating school feeding and public procurement programmes represents an opportunity in this regard, for example giving premiums for organic or agroecological food products. In many countries such a possibility of linking multiple objectives exists. For instance, in India, extensive public procurement programmes exist to distribute food to the poor as well as school children, but this is not specifically linked to agroecological farming (FAO, 2016c).

School feeding programmes based on local agricultural production can reduce market uncertainty for small-scale farmers, improving their income security and lowering the risks associated with the transition towards agroecology. For example, Brazil’s National Plan for Agroecology and Organic Production (2013–2015) includes “trade and consumption of agroecological local products” as one of its four strategic areas. This is achieved through the creation of local markets for agroecological products, mainly through public procurement programmes.⁴ Brazil’s public procurement programme uses the productive capacity of rural families to help meet the nutritional needs of people living in food-insecure areas, providing food to local school feeding programmes, food banks, community kitchens and

⁴ <http://www.mda.gov.br/planapo/>

charities. The programme provides market access for family farmers who meet certain requirements. In this framework, the Brazilian school feeding programme awards a 30 percent premium to agroecologically-produced food. The programme does not lead to an increase in spending and has secured these achievements within existing budgets. As the geographical distribution of schools covers all of Brazil's urban and rural areas (45 million school children), this policy has created an enormous proximity market for the atomized production of smallholder farmers (4.3 million farmers throughout the country), reducing transportation and transaction costs for both buyers and sellers, therefore contributing to lower food prices. Producing for school kitchens means growing more diverse food, which has also had a positive effect on the diets of the farmers themselves (FAO, 2016c). The short marketing circuits in Brazil, achieved through the public procurement programme and the national school feeding programme, are also operating and supporting agroecological farmers in arid regions of the country (Souza and Lima, 2015).

Through South–South cooperation, FAO is currently implementing several programmes to support governments to enhance local food security and nutrition through public procurement and school feeding programmes, mainly targeting family farmers, which in many cases are producing through agroecological systems. The programme “Purchase from Africans for Africa” (PAA), jointly implemented by FAO and the World Food Programme, promotes food and nutrition security and income generation for smallholder farmers in Africa, through the provision of a guaranteed market for farmers’ produce. School feeding programmes are an important partner for public procurement in all five PAA Africa-supported countries (Ethiopia, Malawi, Mozambique, the Niger and Senegal). Lessons from this initiative are presented in Box 2. Another example is the project “Implementation of a model for public procurement within rural family farming for school feeding programmes”, which aims to promote direct public purchases from family farming to the markets of school food programmes. The pilot programme is currently being carried out in El Salvador, Honduras, Nicaragua and Paraguay (FAO, 2015c).

It is important to continue learning lessons from existing public food procurement initiatives worldwide, and their link to sustainable food systems, in order to respond to increased interest in this approach across countries and regions. There are several aspects of public food procurement that could promote or hinder the transition towards agroecology and sustainable production systems that should be further analysed through specific research. Most of those aspects have to do with the interactions with existing policy and legal environments in the country to address sustainable food production. The possibility to scale up public procurement initiatives may depend on the existence of sustainability-oriented agricultural policies and programmes, agricultural services and productive assets, food safety regulations, legal frameworks and public services (e.g. registry of farmers’ associations).

PARTICIPATORY GUARANTEE SYSTEMS

Participatory Guarantee Systems (PGS) are locally-based and voluntary quality assurance systems. They certify producers based on active participation of stakeholders in localized groups – farmers, consumers, researchers, municipal public officials, local businesses – and

Box 2: Public procurement and agroecology: lessons from the FAO/WFP Purchase from Africans for Africa initiative

During the FAO technical seminar, “*What markets support agroecology and sustainable production systems*”, Israel Klug, PAA¹ Programme Coordinator of FAO, presented several lessons learned through the implementation of PAA and other similar initiatives in Africa (FAO, 2016a). Based on these cases, it was suggested that public food procurement programmes have the potential to contribute to creating a supportive environment for smallholder agroecological farmers in the following ways: (i) predictable and regular food public procurement is adaptable to smallholder’s needs and promotes inclusiveness; (ii) creating more competitive markets to protect small farmers from low prices in monopolistic markets; (iii) predictability of prices and contracted quantities may reduce risk of engaging in sustainable food production and marketing, by providing information of future variables and therefore supporting better planning; (iv) regularity of contracted quantities may provide a learning curve opportunity to farmers and their organizations, in order to progressively improve quantity (productivity/aggregation) and quality of food produced in a timely manner; and (v) diversified and/or context-based food procurement (traditional local products) may be adapted to farmers’ skills. Drawing from these considerations, there is room to continue investigating the potential synergies between public food procurement and sustainable production models, especially in terms of impact evaluation.

However, developing and putting PPPs to work may also present challenges and limitations. For example, agriculture in sub-Saharan Africa is characterized by a generalized lack of financial and technical services as well as of technologies and infrastructure, weak regulatory environments and poorly structured value chains. These conditions suggest that productive capacity – which is a prerequisite for PPPs – cannot be taken for granted and that PPPs may need to be accompanied by mechanisms to support production. Furthermore, the success of sustainable public procurement initiatives may depend on the capacity of governments to grant a price premium, which in turn depends on governments’ fiscal capacity.

Source: FAO, 2016a.

¹ <http://paa-africa.org/>

are built on a foundation of trust, social networks and knowledge exchange (IFOAM, 2007). PGS prove to be very efficient in enabling family farmers involved in agroecology and similar sustainable production systems to reach markets in a way that recognizes their particular conditions, constraints and possibilities. It also re-defines roles and responsibilities of local food actors (FAO, 2016a).

Evidence presented during the FAO symposia suggests that given agroecology’s attention to context specificity and adaptation to local conditions, most formal certification standards and systems are often not adequate for linking agroecology to

Box 3: The benefits of PGS according to Argentinian farmers from *Las Tres Colonias*

Farmers at *Las Tres Colonias* in Argentina have been able to use the PGS as a tool to distribute their products not only in their communities but also across the country. They have identified the following synergies between agroecology and PGS: (i) PGS gives agroecological farmers the opportunity to differentiate their production and reach markets through a low-cost, participatory system suited to their conditions; (ii) PGS enables and strengthens participatory exchange of knowledge, capacity building and trust, which is one of the main features of agroecological systems; (iii) PGS facilitates the systematization of local agroecological production techniques through the participatory creation of local protocols, which are often an important component of the PGS; (iv) PGS enables consumers to obtain high nutritional quality inherent in agroecological products at affordable prices, contributing to food security and nutrition; and (v) PGS encourages farmers and local experts to jointly develop innovations in the production methods and in the roles played by the engaged actors, through constant application and adaptation of agroecological principles.¹

¹ FAO interview for the Participatory Guarantee Council of the Agroecological Group *Las Tres Colonias* in the framework of the FAO symposia: https://www.youtube.com/watch?v=1KEB_3Mutq8

markets. Alternative certification schemes, which are often informal, low-cost and participatory – *inter alia* participatory guarantee systems – were presented as the most suitable schemes used by agroecological farmers to sell their produce (FAO, 2015a; 2015b; 2016a; 2016b).

Consequently, the FAO International Symposium on Agroecology for Food Security and Nutrition included under its recommendations that “Participatory Guarantee Systems should be strengthened and supported as should products and inputs needed for agroecological farms” (FAO, 2015a). Likewise, the Latin America and the Caribbean symposium recommended to “create mechanisms which enable the reciprocity of Participatory Guarantee Systems among countries of the Latin American region by promoting the link between the producer and consumer” (FAO, 2015b). In the region, synergies between agroecology and PGS have been well identified (see Box 3). PGS are often recognized and supported by public policies and programmes on agroecology, as stated during the round table discussion on “Public policies to promote Agroecology”, where policy makers mentioned PGS as an important element to be strengthened through public policies, in order to enable agroecological producers to access a wider variety of markets, not just local and national, but also international (FAO, 2015b). For example, the Brazilian System of Organic Conformity Assessment, which regulates organic production, considers PGS as one of the recognized certification systems.⁵

In the Asian symposium the case study of PGS in Viet Nam (as shown in Box 4) illustrated many benefits of this system and participants concluded that participative and

⁵ Sistema Brasileiro de Avaliação da Conformidade Orgânica: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/Decreto/D6323.htm

Box 4: Participatory Guarantee System in Viet Nam

PGS Viet Nam involves direct participation of farmers, consumers and other stakeholders in the verification process. The participation of farmers is required. Costs of certification in PGS are low as they mostly take the form of voluntary time involvement rather than financial expenses. PGS Viet Nam not only guarantees the credibility of the agroecological produce, but also directly links farmers to consumers and alternative marketing approaches. Currently, the interest of consumers in PGS products is growing. From 7.6 ha under PGS production in 2009 with 11 farmer groups in the north of Viet Nam, there are currently 27 ha under PGS production (mostly vegetables), with 370 farmers organized into 41 groups and ten enterprises collaborating along the value chain. While the quantities are still small, PGS has a profound impact on the people who are involved, by providing a stable and higher income for smallholder farmers.

The PGS: (i) provides farmers with a credible, affordable certification system that is compatible with their levels of literacy and time constraints; (ii) provides a marketing tool that can be trusted by consumers because it has clearly defined standards with documented and transparent compliance procedures that are culturally appropriate and backed up by enforceable penalties for non-compliance; (iii) provides consumers with a certification and a brand that can be trusted; (iv) provides wider, economic, institutional and socio-cultural benefits including better health and reduced health costs – for consumers and producers – as well as improved community relationships; (v) capacity building and empowerment for farmers and retailers; market integration and improved local governance; and (vi) delivers environmental benefits such as less waste, improved local biodiversity, reduced pollution and improved environmental sustainability.

Source: FAO (2016c).

low-cost certification schemes such as the PGS were a recommended solution to support markets for agroecological products (FAO, 2016c).

Even with these promising aspects, there are several measures that need to be in place for PGS to reach their potential in linking sustainable agroecological production to markets. During the FAO technical seminar on “What markets support agroecology and sustainable production systems”, and based on an analysis of 15 cases from Africa, Asia, the Near East and Latin America, the following elements were identified that could hinder or favour the emergence of a PGS: (i) cost reduction is an important incentive for engaging in PGS as these systems rely largely on volunteer time, but in certain cases small fees may be needed to balance out time and travel costs; (ii) PGS create multiple levels of oversight, ensuring the credibility of certification; and (iii) shifting roles and sharing responsibilities between producers, consumers, researchers, intermediaries and public officials favour the emergence of reciprocal relationships as opposed to mono-directional solidarity (FAO, 2016a).

Further evidence is needed to enable a deeper and more comprehensive understanding of the implications, opportunities and challenges related to the development of a PGS in the context of agroecological systems.

COMMUNITY-SUPPORTED AGRICULTURE

Agroecology seeks to improve social equity in food systems (FAO, 2015a). Supporters of agroecology are increasingly drawing on approaches inspired by the concept of solidarity economy.⁶ One of the most relevant practices of solidarity economy that is associated with agroecology is community-supported agriculture (CSA) – schemes that offer farmers the possibility of linking to the local community for mutual support.⁷ The FAO symposium in sub-Saharan Africa recommended civil society organizations to “develop networks and mobilize stakeholders to create solidarity based economies that foster agroecology” (FAO, 2016b). Recommendations arising from the FAO symposium in Asia and the Pacific stressed the importance of promoting CSA as a means to strengthen the skills of farmers to better understand and use markets for income and expanded opportunities (FAO, 2016c).

An important element that has been associated with solidarity economies is the opportunity to retain youth in rural areas and in agriculture through agroecology. Social innovation in agroecology is especially important to attract more youth to farming, even more so in Africa where young people represent 60 percent of the population (FAO, 2016b). In fact, this dimension was particularly stressed in the FAO symposium in Africa, which recommended to “take value chains and market development into account in innovations in order to make agroecology more attractive, especially to youth” (FAO, 2016b). Case studies presented at the symposium (FAO, 2016b) provide two illustrative experiences from Senegal. The first concerns the Kaydara agroecological school farm, in the Fatick region, where students are provided with land by participating municipalities and with financial and non-financial capital by the school. Once productive activities are in place, students keep two-thirds of the sales revenues and the remainder is destined to the school for further investments. Students are also involved in reforestation activities and reproduction of seeds. This approach proved key for counteracting the alarming rural to urban migration trends in the area and to strengthen youth sense of belonging. The second example relates to the experience of *La Fédération des ONG du Sénégal* (FONGS), which strengthens solidarity and mutualism among families and the local environment, preventing land degradation and creating local employment. They have moved into new forms of economy, improving rural livelihoods through the development of rural banks to ensure a decent price for producers, developing markets for renewable energy and creating “green” jobs, which keep youth employed in a vibrant rural economy.

A mapping undertaken by Urgenci for FAO in 2015, which studied local and solidarity-based partnerships in the Mediterranean Basin, identified an increasing number of CSA schemes in Mediterranean countries (24 existing systems in 12 countries). The direct relationship and the fact of being in direct contact with the producer were perceived as

⁶ Solidarity economy embraces historical and contemporary economic forms that embed values of cooperation and solidarity and stress the importance of the commons. Solidarity economy is grounded in practice and in the principles of: solidarity, mutualism and cooperation; equity in all dimensions (race/ethnicity/ nationality, class, gender); social well-being over profit and the unfettered rule of the market; sustainability; social and economic democracy; and pluralism, allowing for different forms in different contexts, open to continual change and driven from the bottom-up (http://en.solecopedia.org/index.php?title=Solidarity_Economy).

⁷ See: www.nal.usda.gov/afsic/pubs/csa/csadef.shtml

major assets of this model among the group members. Another common principle had to do with repairing broken social links and reconnecting people with food production. In some countries (Lebanon, Greece, Algeria), the commitment to the CSA model is closely related to a commitment to support the most fragile sectors of society including refugees (Urgenci, 2016).

CONCLUSIONS

This review of the issues related to markets for agroecology, which were raised in the FAO symposia and technical seminar, enables the identification of some promising interventions, institutional innovations and policies, while also raising many questions.

A number of issues have been relatively absent from the debates. For example, the cases presented in the FAO symposia have focused largely on local markets as being more adapted to biodiverse production, even though there has been some mention of global markets, in particular for products such as coffee, tea and cocoa. This raises the question of whether agroecology can be supported through formal and global markets and, if so, under what conditions. Are global markets able to deliver on the ecological, social and economic objectives of agroecology in a sustainable way? Do globally-traded agroecological products like coffee, tea and cocoa have positive social and economic impacts? These questions can already be examined in terms of organic products, which have increasingly important export markets but which are questioned by small farmers for not always delivering on social and economic equity dimensions. Similarly, markets that are important for large-scale farms in the transition to agroecology were not discussed in the symposia.

A second area that has been absent from this debate is that of agroecology beyond crop production. The cases presented have focused almost exclusively on crops, therefore issues that are specific to the marketing of agroecologically-produced livestock, fisheries and aquaculture, such as specific issues related to food safety, also merit more attention within debates on agroecology.

Third, the issue of how markets for agroecological products impact consumer diets and nutritional status has not been examined directly but deserves to be considered. Do the types of markets where agroecological products are sold tend to change consumer behaviour and improve diets?

With regard to the question of institutional and organizational mechanisms, a number of issues have been raised that are worth summarizing here:

1. Further research is needed on how to strengthen producer organizations for the marketing of agroecological products, in particular analysing the dynamics and roles of multiproduct traders with increased diversity across products and across seasons, as well as the innovations often promoted by producers' organizations in terms of the distribution of benefits and risks.
2. It is necessary to continue learning lessons from existing public food procurement initiatives worldwide, and their link to sustainable food systems. In particular, the interactions between public procurement programmes and existing policy and legal environments that address sustainable food production require further attention. FAO is currently developing guidelines on institutional procurement and this

initiative offers the opportunity to consider how agroecology could be supported through public procurement programmes.

3. With regard to PGSs, greater understanding is needed on elements that could hinder or favour the emergence of PGSs, including how to ensure sustainability given the reliance on volunteer time.

The questions raised by this review highlight the need for greater collaboration across academic disciplines. Although the efforts of agroecological researchers and practitioners have traditionally been focused on the agronomic side (De Molina, 2013; Méndez, Bacon and Cohen, 2013), interest in the social and economic aspects is growing (FAO/INRA, 2016), which has led to an increased recognition of the need for transdisciplinary research on agroecology (Méndez *et al.*, 2013; Caporali, 2010; Dalgaard, Hutchings and Porter, 2003). On the one hand, this is due to the specific socio-economic characteristics that underlie healthy agroecological systems and that represent fertile ground for research. These include the strengthening of social capital (Pretty and Smith, 2004), the reduction of social and economic risks for farmers and the improvements in social-economic resilience (IPES-Food, 2016; Silici, 2014; Gliessman, 2006; FAO, 2001), the maximization of knowledge transfer and social learning (Mapfumo *et al.*, 2015; Hinrichs, Gulespie and Feenstra, 2004), the improvements in organizational capacity and their implications for democratization and local governance (Cardoso and Mendez, 2015) and the emergence of alternative market and institutional configurations surrounding agricultural systems (Thrupp, Colozza and Choptiany, 2015; Renting, Marsden and Banks, 2003; Vicovaro *et al.*, 2015; Renting, Schermer and Rossi, 2012; FAO/INRA, 2016). The interest in these topics is rooted in the understanding of food systems as social-ecological systems in which technical systems and rural societies co-evolve, mutually influencing each other (Hainzelin, 2015).

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Campagna Amica farmers' market network: economic and social sustainability – is the community back on the market(places)?

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ABSTRACT

The farmers' market network of *Campagna Amica*, the major Italian initiative, has been steadily increasing its spread and relevance over the last 15 years, both in terms of producers' and consumers' interest. While the environmental benefits due to seasonality of the consumption and reduced transportation ("zero miles") are clear, and received attention in literature, one still emerging and promising issue is about the delivered benefits in terms of economic and social aspects.

Restoring the sense of community and *bridging the countryside to the city (as well as citizens to the countryside)*, the farmers' market recovers the ancient notion of a marketplace – a place in which interactions occur by means of the real people involved and not by an abstract relationship mediated by money. The "short food chain" aspect, allowing for the direct meeting of producers and consumers, while levelling the information asymmetries usually present in wider marketplaces, is furthermore a key aspect to rebalance the food chain market power of the producers.

INTRODUCTION

Campagna Amica is the biggest Italian and European farmers' market network (and, more broadly, of direct sales), empowered and led by the Coldiretti Farmers' Union.

Not by chance, Coldiretti (with about 1.5 million of associated people) is the organization that in Italy first committed itself to promote short food chains, in an *era dominated by large retailers and giant corporations*.

However, this is neither by chance nor due to a romantic vision of the future. It is instead the natural progression of an increasing attention to the direct linking between producers and consumers, started in the 2000's with the *Patto con il Consumatore* (Agreement with the Consumer) strategy.

Coldiretti realized that consumers were not aware of what they eat, of the origin of the food, and of the importance of agriculture for the survival of the entire society. For this reason, in 2007

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Figure 1. The evolutive conceptualization: from a general “political” message to consumers to a specific, stylized brand for marketing purposes

Coldiretti created *Campagna Amica* (see Figure 1), to enable consumers and producers to talk to each other, and when in 2009 it started building the network of direct selling points of Italian agricultural food products, these places became spaces where consumers could buy high-quality food, but also receive information about that food, producers, sustainability, biodiversity and agriculture in general. Within the farmer’s market, experts of Coldiretti

or Campagna Amica started informing – and they still do – consumers with the distribution of printed materials and face-to-face informative activities.

Direct sales are in fact the *natural resource* at disposal of “multifunctional” enterprises, according to the evolutive EU view of the agriculture sector (from the CAP Reform of Agenda 2000)²: as able to mix up the production phases, in order to encapsulate income – *including the distribution stage and by-passing the traditional distribution circuits*. Also, as a result of Italian Law D. Lgs 228/2001, strongly requested by Coldiretti, farmers have been secured, in recent years, an overall “food chain” approach, and are able to sell their products directly all over Italian territory, even by means of innovative channels (e-commerce).

This “food chain approach” is just the other side of the coin to the one stemming from food safety (from the Reg. (EC) 178/2002 (European Commission, 2002), the famous “*from farm to fork*” approach: able to provide all the relevant information (to consumers and authorities) in a unique, coordinated and seamless way.

In decades of decreasing farm-gate prices and income, Coldiretti furthermore set up the *Campagna Amica* Foundation, with proper governance of the Coldiretti farmers’ markets and to explain to citizens the importance and value of agriculture. Since its start, the Foundation has worked to gather initiatives aimed to promote, value and enhance the quality of local food products and their links with the history, culture and traditions of the country.

Under the name of *Campagna Amica*, Coldiretti built an Italian agricultural supply chain, with the objective of building up an agro-food system able to offer consumers high-quality food products and to allow producers to gain a fairer value for their work.

Thus, in 2010 the National Network of Selling Points of *Campagna Amica* was launched, a commercial network of farmers where only 100 percent Italian and agricultural products are available. At the beginning, the Network was made up of 550 farmers’ markets. By August 2016, the number of direct selling points had increased to 10 336 farms, farmers’ markets, agritourism and shops, 485 restaurants, 211 urban gardens and 34 street food shops in urban areas.

² See the Agenda 2000 (European Commission, 1997).

The origin, Italian and agricultural, of food is guaranteed by a system of controls implemented by *Campagna Amica* and conducted by:

- A first self-check of producers and suppliers of the Network, that should formally accept the rules imposed by *Campagna Amica* (declaration on the origin of products, acceptance to be under an external control and related penalties, use of the common visual signs, etc).
- A second control made by the officers of the territorial services of Coldiretti (entitled *Impresa Verde* and distributed in all Italian territory) that produce a dossier for each farmer analysed.
- A third control made by an external subject on the dossiers produced during the second phase.
- An additional control conducted on farmers' markets and shops by a group of experts coordinated by the *Campagna Amica* Foundation.

To guarantee the functionality of the Network, to make it recognizable among other experiences, and to not disappoint consumers, Coldiretti and *Campagna Amica* defined a set of rules that farmers should respect to participate in the Network. They include:

- a. the use of the same brand, colours, tablecloths, apron and other signals;
- b. the acceptance of the Regulations about the use of the brand;
- c. the acceptance of common behavioural rules;
- d. the acceptance of the Code of Ethics on environmental issues;
- e. the acceptance of the control system.

The existence of these rules, visual marks and a logo, recognizable and common in the entire Italian peninsula, made possible an effective word-of-mouth system among consumers that promotes a virtuous cycle of growth and development of the Network of *Campagna Amica*.

FROM ABSTRACT MARKETS (AS INSTITUTIONS) TO REAL MARKETPLACES

One of the most interesting features of the farmers' markets – in the era of virtualization, abstracted financial instruments and, more broadly, non-intermediated purchasing contract relationships – is the possibility to restore the ancient and traditional notion of a “marketplace” as opposed to the disentangled and ethereal “market” institution.

Apart from its romantic features (and appeal), the notion of a marketplace not only seems to be congenial to the immediate traffic of real consumption goods, as food is, but also able to amend several market failures.

In particular, a marketplace in which farmers are immediately available allows gaining access to several pluses:

- lower asymmetries in information (first-hand information, data about breeding, cultures, production cycles, places of provenance, etc.);
- direct incentives of selling quality products, due to the reciprocal *trust dimension*. This has two major features: the first being the “face to face” relationship between the producer and the seller; the second due to what in game theory is considered a continuative-in-time interaction with the possibility to sanction producers not complying with the quality promises (by discontinuing the purchase in the case of lack of satisfaction);

- word-of-mouth by the consumers, with a positive “pro-competitive” environment in terms of positive attitude reinforcement of quality attributes desired. This positive climate acts in the long term favouring an informal alignment among the participants in the market (club dynamics,³ Nordhaus [2015]), due also to the presence of a governance (incentives, sanctions) in charge of the *Campagna Amica* Foundation (FCA).
- lower conscious marketing and phishing tools (Shiller and Akerlof, 2015) due to the principal status of producers and not of traders, with lower recourse to claims, puffery and marketing traps. In brief, consumers are able to check the price–quality ratio also by means of a direct knowledge of the farm, where it is placed, with often attached information on the entrepreneurial history (and the family!). Curiously, while Internet and Web marketing of food is increasingly becoming widespread, in the case of fresh produce with a short shelf-life, traditional routes to gain information (promotion, labelling, etc.) are not (fully) practicable and the physical co-presence of producers and consumers in local markets may again maintain its overall validity. Hence the perfect completion of a “flat word” free of market barriers (Friedman, 2005) are of no practical utility.

In similar conditions, the hypothesis of “market lemons” (Akerlof, 1970), i.e. of lower quality products dispatched as being of higher quality, if it cannot be excluded *a priori*, may certainly be kept under control by the “average, conscious and informed consumer”.⁴ In particular, the organoleptic quality of the food is immediately evaluated by the consumers via frequent recourse to offerings of testing samples of food (slices, pieces) before the proper sale. This is easily possible due to both the *compresence of producer and consumer*, contrary to what often happens in modern retailing, and to the presence of loose foods prepacked under the *direct command* of the consumers, but with no “barriers” between the food and the consumers, which may mislead about the *visual appearance* and more generally about the food qualities.⁵

Often this direct engagement with the producers has been deemed as a peculiar facet of the so-called “community supported agriculture” (CAS) (VanderTuin, 1987) but, to our perspective, it makes perfect sense to judge how the creation of (economic) value (freshness, quality, information, etc.) is not a form of donation or support for public goods, but rather the *willingness to recognize the “enlarged value” of the food because of a number of quality attributes of the food in itself*.

³ According to Nordhaus (2015), club rules allow overcoming the free-riding problem in the presence of public goods (non-excludability, non-rivalry [individuals cannot be effectively excluded from use and where use by one individual does not reduce availability to others]). Clubs are a successful solution for this. “The major conditions for a successful club include the following: (1) that there is a public-good-type resource that can be shared (whether the benefits from a military alliance or the enjoyment of a golf course); (2) that the cooperative arrangement is beneficial for each of the members; (3) that non-members can be excluded or penalized at relatively low cost to members; and (4) that the membership is stable in the sense that no one wants to leave”.

⁴ The Court of Justice held (Case C-210/96 Gut Springenheide and Tusky [1998] ECR I-4657, para 31) that “...in order to determine whether a particular description, trade mark or promotional description or statement is misleading, it is necessary to take into account the presumed expectations of an average consumer who is reasonably well informed and reasonably observant and circumspect”.

⁵ This more frequently happens in modern retailing, since the “experience” sensorial evaluation of the food is postponed until domestic consumption. Consumers hence have to rely on the “credence” evaluation most of the time, with possible phishing.

Obviously, any well-ordered farmers' market needs also baseline rules in order to avoid typical and well-known reputation-milking behaviour (Herbig and Milewics, 1995) of the (collective) reputation (Winfree and McCluskey, 2005) of the farmers' markets. Avoiding free riding (Hardin, 1968; Albanese and Van Fleet, 1985) is hence necessary to the survival of the whole network.

Milking the reputation is possible because:

- either the food items are not fully under the “experience” category but encompass also a “credence” feature: this means that consumers may well continue to trust the quality attributes of a product in spite of the (mildly good or bad) tasting experience;
- either because it is expected that at least the prevalent part of the firms behaves properly; it is well known that, under such conditions, *rules for quality schemes* are needed in order to protect from free riding and opportunistic behaviour.

Club rules are hence established to avoid properly not only free riding and reputation dilution in the long term, but also to create a common cultural flagship facilitation – by a common cultural background – cooperation across the enterprises. This, present under the governance framework of *Campagna Amica*, allows for three different levels of control (two external and independent from the mere enterprise internal control).

Hence, it seems interesting to further observe the reputation mechanisms able to attract the consumers, beyond the intrinsic quality attributes expected in single and aggregated food items.

Among the consumers' reassurance systems analysed in literature, able to lower critical information asymmetries and so by-passing mistrust as a major obstacle impeding purchasing, we find apt the *conventions theory* by Boltanski and Thévenot (1987, 1991). As coordination mechanisms, they also absolve the scope of favouring cooperation among producers, which is the second, strictly intertwined aspect. Quality of the product is assumed to be the natural result of some form of cooperation mechanism and process across the relevant players. Hence quality is a collective result more than an individually achieved one – hence may be reached by “conventional” or coordination mechanisms.

DOMESTIC AND CIVIC CONVENTIONS ON THE RISE

The principal coordination mechanisms among actors (consumers–producers and producers–producers) in the agro-food system, which also represent particular quality conventions, are (Pacciani, Belletti and Marescotti, 2000):

- **Market coordination (convention):** “Based exclusively on market relations and price; the actors are able to evaluate by themselves the quality of the goods exchanged at the moment of the market transaction; they do not need further support to justify their actions apart from the price.” *While this assumption could prove to be good at the very beginning of the economic theory conceptualization, in the era of increasing awareness gained on the prevailing role of behavioural processing (over the cognitive one), market convention in its purest form has been at least partially dismissed.*

A number of biases, traps and framing effects, are able to explain behaviour in empirical contexts, whereas the price and consciously passed information represent only a minimal part of pre-purchasing stimuli (Thaler, 2015; Simon, 1957; Frantz et al., 2016).

- **Domestic coordination (convention):** “The coordination among actors is based on face-to-face relationships, on personal trust established in previous transactions. The connections established between the actors are stable and lasting in time”.

Globalization, paradoxically, made this connection, resurge again, because of mistrust in long food chains and related scandals. Origin labelling, zero miles, direct sales, farmers markets – along with others – seem to be part of return to domestic coordination.

- **Civic coordination (convention):** “The coordination and justification of actions is based on the actors’ adherence to a nucleus of collective principles; the individual actors renounce their own individuality and do not consider their own personal interests in order to concentrate on the common good and/or aim.”

Again, in an era of “Big Food” emergence, with increasing concentration of the resources in the hands of a few players due to the competitive run, and with profit mechanisms showing all their limits (externalities in the shape of the public health burden of non-communicable diseases such as diabetes and cardiovascular diseases; or environmental externalities), the willingness to take care of the community and to produce public goods is probably at its height, even if precise and consensual evaluative metrics are still questioned. According to Pacciani, Belletti and Marescotti (2000): “the purchase and consumption of a traditional product by a local consumer becomes a symbolic act, a vehicle to express collective belonging. In the same way a non-local consumer can purchase directly from the producer stimulated by a market quality convention when the motivation is to save money, just as he/she can be moved by a desire to safeguard the traditions and gastronomic wealth of an area within a civic convention”.

- **Industrial coordination (convention):** “The coordination and exchanges are based on the respect of standards; quality is a given if the characteristics of the good/service comply with a set of standardized and codified rules.”

As for market coordination, industrial coordination has for sure a role and allows a lowering of information asymmetries. However, as recent fraud cases illustrated, quality schemes both at industrial and artisanal level are not immune from counterfeiting and tampering (from extra virgin olive oil of big brands to Brunello wine of well-established geographic indication [PDO] brand). On the contrary, quality schemes can be more susceptible to fraud about the declared quality and origin, due to the higher profits expected.

- **Opinion coordination (convention):** “Contrary to domestic convention, but similar to market convention, the opinion coordination convention is not mostly based on a direct experience, on transaction repetition, on memory. The quality of a good is judged exclusively by the opinions of others and the reputation of the operators.” This convention entails the trust dimension in the form of fashions group-thinking and word of mouth, with all the risks entailed (i.e. see financial bubbles).

This convention – due to its social nature – seems interlinked with any “consumption” experience, especially when social media, and more broadly the Internet, allows for a fast feedback on the quality of the goods purchased pass

a line. Since each of the quality conventions can go hand in hand with one or more, and lacking a hierarchy among them, (Pacciani, Belletti and Marescotti, 2000) stated that “product specificity derives from the realization of the variety of coordination conventions among the actors”.

This description of conventions is particularly relevant here. It allows the conceptualization of *Campagna Amica* farmers' markets as an overall, holistic and emerging “product” (single food items + attending public + marketing mix + conventions), deriving its particular status at the intersection across several conventions, and in a truly innovative way.

Departing, for instance from the sociological tradition of Bourdieu (1984), linking specific food items to social status (this discerned that red wine and meat are apparently increasingly consumed by the working class), interestingly the *Campagna Amica* farmers' markets model shows that status is not the only variable predicting purchasing (see Figure 3).

All in all, we can easily say that the *Campagna Amica* farmers' markets network allowed the overlapping of different *coordination mechanisms*, communicating several quality aspects, in an unanticipated and composite way, able to reflect the value *polytheism of values (and of the consumers)* (Vattimo, 1988; Coldiretti-Censis, 2010) and the new will of the producers to take part in the market in an active way, being part of the product. For sure, the domestic convention (face-to-face and trust in farmers) mechanisms couple well with the civic convention (*produce values while adding value*), as the prevalent ones. However, even if somehow of minor role, the industrial convention mechanism (due to quality certification by a third party), market coordination and opinion coordination are still present as expected in a real market.

The consumers' survey produced by Ixè-Coldiretti (see below) (Ixè, 2015) reflects:

- The different degrees of interest in the quality conventions as summarized. Social values, tradition, cooperation and attention to more baseline price–quality ratio (market coordination) or also only quality attributes (industrial coordination) melt together to mirror a composite yet not completely stratified set of purchasing behaviour.
- The overall sociological frame, dealing with the different purchasing motivations to get access to the *Campagna Amica* farmers' markets. Healthiness, genuinity but also intention to support the rural community or, more widely the countryside – as well as taste – are all attributes actively searched for, even if entangled and not easily separable.
- *Polytheism of values*: modernity and tradition, hedonism and ethics, gourmets and first-price consumers: the *Campagna Amica* farmers' markets reflect a fragmented universe of consumers, and allows to satisfaction of different (emotional and economic) needs.

“Where the consumer's heart is?": bridging the countryside to the city and citizens to the country

An overview of the consumers' survey produced on a regular basis by Ixè-Coldiretti (market and political surveys consultancy), is now presented, having in mind the promising theoretical framework suggested.

The baseline consumer profile responds to the following attributes:

- Mostly feminine: 62 percent women
- Young: 48 percent with an age between 35 and 44 years
- Educated: 68 percent having medium-to-high school education

At the time of better profiling them, there are three apparent profiles of customers.

The first, “**epicureans**”, is characterized by age (25–44 years old; 55–64 years old), high school education, and medium-to-high economic position. These customers live prevalently in northwest Italy. They are mostly foodies and “gastronauts” (65 percent of them share this attitude).

The second, “**healthy eaters**”, are more attentive to health – and search actively for food safety information and ingredients, recipes, etc. (74 percent share this attitude). They are mostly 55–64 years old, with high school education and from high-to-medium economic position. They are present mostly in the northwest, south and the islands of Italy.

Eventually the third group, “**conscious consumers**”, attentive to the quality–price ratio (34 percent share this attitude), are mostly women, with an age of 25–34 years old and over 64 years old, share a low cultural level, and many of them are retired and single or widows. They live prevalently in central Italy and the islands.

It is also noteworthy that the average time spent in a *Campagna Amica* farmers’ markets is 32 minutes (22 for the shopping experience inside the retail outlet with an average expenditure of 26 euros (45.44 euro in hypermarkets and 28.04 in supermarkets; average expenditure, regardless the retail format: 28.79 euros (Nielsen Consumers Panel Survey, 2015, unpublished data). It suggests a shopping *experience radically different* from the one inside retailing outlets, with more time to elicit the products and interact with the producers, and with slightly less expenditure.

This obviously magnifies the relational feature of this purchasing experience (“*price and personal preference*”), due to the willingness to better know the products, asking about the production–cultivation methods, locations, etc.

SATISFACTION AND EXPECTATIONS

The experience is positive: 91 percent of purchasers suggest the experience to friends, with 79 percent of consumers very satisfied, 18 percent somewhat satisfied and 3 percent not satisfied. Seventy-four percent of customers declare themselves willing to come back to the markets, 21 percent state it is “probable”, and 4 percent “perhaps”. Loyalty and fidelity also scored well against price elasticity: with a general price increase, 6 percent of the customers would come back again for sure, and 34 percent “probably”.

Coming to the motivational aspects inducing purchase, the leading ones refer to food safety and quality (63 percent of the consumers), taste (39 percent), but also saving (28 percent).

The top reasons for satisfaction are summarized in Figure 2.

With regard to declared expectations (Likert scale from 1 to 10, from not relevant at all to fully determinant), and answering the question “how much do the following aspects count in motivating you to go to a *Campagna Amica* farmers’ market”, “seasonality of the supply” comes first (8.7), followed by the “local-regional aspect of the supply” (8.6), the “price–quality ratio” (8.6), “the direct relationship with the producers” (8.3), the low price

point (8.2), the “width of the supply” (7.5), the “familiar atmosphere” (7.5), the relaxation enjoyed during the “shopping experience” (7.1), until “originality of the supply” (7.1), the “structure of the market” (7.0) and “a chance to spend good time with the entire family” (6.1).

INTEREST ON SPECIFIC TOPICS, FACILITIES AND ADDITIONAL SERVICES

Another promising aspect of reflection for the future development of the farmers' markets refers to the interest expressed by the customers on specific topics. In particular (Likert scale from 1 to 10, from not relevant at all to fully determinant), and answering the question “how are you interested in searching for...”, “tickets with numbers to line up” received a 5.9 score, “vegetables cleaned and cut” a 5.4, “fresh products packed”, “ready-to-use salads and similar” a 5.3 and “prepared meals” a 5.1. It is relevant to stress how consumers expect more and more convenience

also from farmers' markets, and not only loose, commodity products. This reveals opportunities for additional value added, with the condition of a growth of the firms in terms of logistic and marketing capacity. Such aspects are also apparent in the interest about services-facilities (Figure 3), with a diversified number of services, ranging from hot meals to a coffee corner and dog-pen but also including social aspects (cooking courses and collective purchasing groups).

CONCLUSIONS

The farmers' market network of *Campagna Amica* was able to intercept the diffused demand for local, quality products, with an overall social-network activation, and producing a *different consumption experience*.

If producers are ready to promote a real cultural leap, in order to gain marketing capabilities (from producing to selling), the challenges ahead refer to the constraints/possibilities of local and seasonal products, which, while limiting the overall supply in



Figure 2. Top reasons for satisfaction of the *Campagna Amica* farmers' markets and sales venues



Figure 3. Interest in additional services-facilities
Source: Ixè (2015).

front of exigent consumers well acquainted with the wide modern retail offer, are fit to the specific type of supply. A possible solution is inside the same consumers' demand, as emerging from the survey of Ixè, pinpointing the coupling of attributes, which are apparently at odds, such as on the one hand the request for freshness and "zero miles", and on the other, the request for the "convenience factor" (processed meals, ready-to-use products, etc.). *This is able to re-shape the traditional perception of farmers' markets as places in which to source mainly fruit and vegetables, and fresh – not transformed – food, and implies the chance to upscale the value ladder encapsulating additional income usually left to other food chain players.*

Another aspect that needs reflection at the governance level is the correct application of national laws (labelling, hygiene rules, etc.), at the level of single firms: with stricter standards demanded versus the baseline regulations, and with the always present hazard of *free riding* (i.e. non-compliant players hiding behind the collective brand). Club rules seem a promising tool, with both moral and institutional incentives/sanctions (non-compliant farmers are excluded). Shared values and a strong cultural background across farmers seem relevant, endorsed by continuous controls by second and third parties – which proved to be fundamental. Due to the increasing dimension of the *Campagna Amica* farmers' markets, however, the risk of free riding and reputation milking increases (group size proposition: "beyond the level of very small groups, unless coercion, special incentives, or both are used, increases in group size lead to increases in free riding." (Albanese and Van Fleet, 1985), signaling the need for stronger disincentives and sanctions.

In fact, the chance of club rules infringement is proportional to the Becker's formula (1968) (probability to comply depends on the chance of being discovered and punished multiplied by the importance of the penalty).

Last but not least: it is key to note the *embeddedness of food* in networks and the broader social environment. Ethical motivations are hence not an exogenous factor but, on the contrary, are intertwined in social layers (friendship, neighbourhood, proximity to the farmers). We explored this issue in the case of extraordinary sales of Parmigiano Reggiano in the aftermath of the earthquake in 2013 in Emilia Romagna (Finardi and Menozzi, 2014). Again, "embeddedness underpins that social aspects come before and shape economic relationships, melting with them" (Finardi and Menozzi, 2014).

This preliminary research shows the need to collect data better at EU level, in order to elaborate the "whole picture" and to further reflect on how, according to the legislators, will the idea of the "EU agricultural model" evolve in practice.

Another aspect deserving further investigation is obviously the progression in learning and explaining the interlinks between environmental sustainability and other kinds of sustainability (societal, economic, relational, etc.), in the promising direction of the Mediterranean diet framework (CHIEAM/FAO, 2015).

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Approximation to short food value chains in developing world: a case from Mexico City

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ABSTRACT

Proximity is a defining characteristic of short food value chains (SFVC). Proximity in geographical but also social or organizational terms enables the construction of a common vision in relation to food consumption. The organizational proximity generates new relationships between consumers and producers who abandon their usual passive attitude and acquire a more active role, generating innovative relationships with each other. This will support new forms of food citizenship, with active participation and conscious clarity about food and how it is produced. This concept is strongly linked to quality attributes beyond physical appearance and freshness, bringing about values such as tradition, origin and culinary, all related to identity. It implies ensuring quality by carrying out sustainable farming practices and considering geographical or regional characteristics. There is a process of change observed in the generation of governance mechanisms in agrifood systems as an alternative to global chains. This paper presents conceptual and practical elements of SFVC from an example in Mexico City emphasizing on innovation applied in the interactions between producers and consumers. There, FAO is working towards responding to the great challenge to design strategies for feeding the city from the surrounding areas' supporting short food value chains. Nearly 59 percent of Mexico City is considered rural and concentrated in the southern part of the city, and reported annually 456 000 tonnes of agricultural production and 19 thousand tonnes of livestock products. However, 70 percent of what is consumed in Mexico City comes through the wholesale market, the biggest in Latin America. Traditional flea markets (*tianguis*), local fairs, specialized stores and institutional procurement are to be promoted, allowing producers and consumers to exchange products and knowledge aiming to promote agroecology, biodiversity and fair trade relationships, with the support of social intermediaries.

INTRODUCTION

Proximity is the core characteristic of short food value chains (SFVCs) (Parker, 2005). According to Parker, proximity – either geographical or organizational – is the basis of a collective construction towards a new vision and identity around food production and consumption. The scope of geographical proximity is relative – some mention a perimeter between 50 and 200 km² – varying according to availability and quality of roads and transport means, while organizational proximity refers to building conscious relationships

between consumers and producers independent of the distance and where both actors assume more active roles in their decisions related to food production and provision (Renting, Marsden and Banks, 2003).

An enriched definition of food quality is associated with SFVCs, where the conventional attributes – based on physical characteristics such as freshness, colour and size – are broadened to integrate characteristics such as tradition, identity, culture, sustainable practices and/or local production. Thus SFVCs engender positive effects on reinforcing site-specific identity around food by encouraging local actors to assume active roles and new relationships, so-called new forms of “food citizenship” (Renting, Schermer and Rossi, 2012). Often SFVCs are mediated by market and institutional innovations driven by social movements, with or without the support of the public sector, and facilitated by IT development. It is mentioned that as SFVCs are an expression of new governance mechanisms generated in the food systems, they can challenge globalized value chains or run parallel to the mainstream markets.

SFVCS operate through different market channels and schemes, thus a typology can be of help to design differentiated policy and strategic support.

In Table 1 four types of SFVCS are shown using the proximity concept (adapted from Aubry and Kebir, 2014) and examples were presented to an international workshop on SFVCs held in Mexico in 2016 (FAO/PNUMA/Ford Foundation, 2016). In Case 1, both geographical and organizational proximity are weak, producers and consumers are anonymous and information about production practices is unknown (e.g. global value chains). In Case 2, although the food is locally produced, the consumer/producer relationship is weak, so clear transmission of information is missing (e.g. wholesale markets). In Case 3, organizational proximity is strong, and though good information about production practices are known, distances between producers and consumers can be very long (e.g. online or pre-ordered sales). Finally, Case 4 is where proximity is strong at both levels (examples are local fairs, tianguis (mobile markets), on-farm sales and school food procurement).

DRIVING FORCES

It is sustained that the development of, SFVCs is a phenomenon that emerges as a response to several legitimacy crises in the current governance of food systems (Renting, Schermer and Rossi, 2012). As a result of globalization, privatization and market liberalization policies, the expansion and concentration of food sales in retailer chains diminish the role of local food systems. The emergence of food-borne outbreaks mainly within the large retail chains, particularly in European countries, also adds to the trust crisis. Another associated force is the consolidation of private standards as a *de facto* mandatory market requirement where agricultural, handling and management practices are dictated far away from production sites (FAO, 2011; FAO, 2013; FAO, 2014). Also as a corollary of market liberalization, a budget crisis is generated in the public sector by the reduced income coming from market transactions. Also, as a more recent trend in some regions, the fiscal crisis is compounded by decentralization policies where resources should be shared with public sector actors at regional and local levels. Consequently, SFVCs emerge as a response to economic and financial crisis where civil society actively takes a role in food systems by demanding

Table 1: Typology of short food value chains

Organizational proximity	Geographic proximity	
	Weak	Strong
	Weak Case 1: VC with direct relationships • Sells to international markets	Case 2: VC with indirect relationships • Sells to local supermarkets • Baskets sold to intermediaries • Wholesale markets
	GLOBAL VALUE CHAINS	SHORT VALUE CHAINS
Strong	Case 3 : VC with close relationships • Direct sales online • Pre-order sales • Basket with pre-order sales	Case 4: VC with direct relationships • Fairs, local & niche markets • Public procurement (school feeding, others)
	SHORT VALUE CHAINS	SHORT VALUE CHAINS

Source: adapted from Aubry and Kebir (2014).

wide-ranging food quality attributes including the exigency of sustainable practices within a social learning process. However, the expansion and further development of SFVCs will require capacity building, investment and greater opportunities for exchange of products and knowledge, if this phenomenon is expected to influence global trends and governance.

The peri-urban *Chinampa* and *Milpa Solar systems* around the wetlands and hillsides of Mexico City are presented to illustrate the specific characteristics that SFVCs – as an example of Case 4 – take in a developing country. Strategies proposed to support its further improvement are also discussed.

THE PERI-URBAN CHINAMPA AND MILPA-SOLAR SYSTEMS AROUND MEXICO CITY

In the southern peri-urban area of Mexico City, the remains of the *Chinampa* and the *Milpa-Solar systems* provide food and social and environmental services yet with great challenges. Dating back to pre-Hispanic time, these agricultural systems have been recently denominated sites of global important agricultural heritage systems (GIAHs) by FAO, (2016); nevertheless, urbanization pressures are competing with them for land, labour and water resources. These systems are located in the remaining wetland areas around Mexico City – the third major mega-city in the world with over 20 million people and characterized by a high concentration of food distribution. Certainly, Mexico City hosts the biggest wholesale market in Latin America and one of the biggest in the world, which concentrates nearly 70 percent of food procured for the city. Another characteristic of the food system in Mexico City is the increasing obesity rates being registered both in children and adults, probably as a consequence of bad consumption habits, generating public health concerns.

BRIEF OVERVIEW OF THE SYSTEMS

The *Chinampa* system is defined as an articulated set of floating artificial islands built based on oral transmission and prevailing culture since pre-Hispanic times. The islands are surrounded by canals or ditches and rows of *ahuejotes* (*Salix bonplandiana*), a species

of native willow that performs several functions, including as live fences and windbreaks, and encouraging insects, enabling habitats for birds and reptiles, as well as preventing soil erosion in the plots (Gobierno de la Ciudad de México, 2016).

In the *Chinampa* system, a diversified agriculture is practised that includes horticulture, floriculture and production of staple crops for regional consumption, particularly for the inhabitants of the Mexican metropolis. The system supports a high agricultural productivity, due to crop intensification; it cultivates three to four crops in four periods of 90 days each, while in the case of ornamentals it rises to five to six crops in shorter periods of time. The productivity by crop is between 10 and 15 tonnes/hectare depending on the type of crop. These production systems require high application of skills and knowledge in handling and managing ecological cycles and interactions within the components of the agro-ecosystems.

Besides agricultural products, the system offers ecological niches for aquatic fauna and endemic or transient bird populations. Although occupying only 7 534 ha, the *Chinampa* site contains 2 percent of global biodiversity and 11 percent of the countries. There are 139 species of vertebrates, including 21 species of fishes, 6 of amphibians, 10 of reptiles, 79 of birds and 23 mammals, many of them under conservation status. It is also considered a cultural and productive site and represents an aesthetic landscape, articulating water, soil, trees, wildlife and the natural environment. Therefore, the traditional *Chinampas* system synchronizes specific forms of social organization, lifestyles, ways of organizing productive land, traditional forms of community, technical skills and formal training conforming to a type of “*Chinampa* stewardship” (Gobierno de la Ciudad de Mexico, 2016).

It is reported that 12 000 families are directly involved in agricultural activities in the *Chinampa* system (Torres-Lima *et al.*, 1994, cited in FAO/UNEP/Ford Foundation, 2016) that provide 35 percent of total household income while the remaining income comes from urban employment or commercial activities. An income of between USD300 and 500 per month is estimated for horticulturists, and three times more for flower growers.

In complement, the *Milpa-Solar system*, a system surrounding the hillside area of Mexico City, is set up by the *Milpa*, the traditional Meso-american farming system, that is defined as an intercropped field with three principal species – maize, beans and squash (*Zea mays*, *Phaseolus spp.* and *Cucurbita spp.*) – often associated with other minor species and the Solar, a usually female area with a high diversity of animal and vegetable species located next to the family house.

BRIEF OVERVIEW OF THE MARKETS

As mentioned before, nearly 70 percent of Mexico City production and consumption is channelled through the wholesale market. A diversity of market channels and food networks makes up the remaining 30 percent, among which should be mentioned: the public markets (well-established and selling undifferentiated products, with commercial intermediaries); mobile markets (formally established with the participation of organized producers); tianguis (direct market sales by producers, an informal and unstable market, differentiated and diversified products); specialized local stores and restaurants (selling conventionally certified products targeting high-income consumers); and Web-based sales (differentiated products) (Quintanar, 2014).

These food networks are strongly supported by social intermediaries who play an important role in strengthening social relationships between market actors, promoting knowledge exchanges and collaboration through the implementation of participatory guarantee systems and/or providing capacity development. These networks are, however, also threatened, *inter alia*, by the rising power of the retail sector in the context of the urbanization process. In this regard, strengthening proximity can be deemed crucial for preserving and reinforcing these networks and the productive systems that feed them.

To respond to the need to provide healthy and locally produced food to the Mexico City population, while preserving the *Chinampa* system and *Milpa-Solar system*, different actors have attempted to promote SFVCs. FAO has been requested to contribute to this endeavour by providing advice and technical assistance and proposing policies and strategies to the local authorities represented by the secretariats such as SEDEREC (Secretaría de Desarrollo Rural y Equidad par alas Comunidades) and SEDESOL (Secretaría de Desarrollo Social).

BUILDING PROXIMITY RELATIONSHIPS FOR THE DEVELOPMENT OF SFVCS

In the construction of short value chains, social values associated with food are mobilized (confidence, health and nutrition, culinary, tradition, youth employment, community livelihoods) by local actors, practising sustainable agriculture and building novel market channels for their products in a specific territory. In this process, new rules are created through market interactions (SFVCs Case 4) that do not replace but complement those existing in conventional channels (Cases 1 and 2). Nevertheless, trying to build proximity in the SFVCs where *Chinampa* and *Milpa-Solar systems* participate would not be free of tension among the actors in the territory, so the new rules and expanded notion of food value need to be prized by consumers through recognition and loyalty to producers. Institutional innovations such as participatory guarantee systems (FAO, 2016) play an important role for building recognition and loyalty and for knowledge about products from agro-ecological systems such as those



Figure 1. Strategies to support the peri-urban *Chinampa* and *Milpa-Solar systems* within SFVCs in Mexico City

generated by the *Chinampa* and *Milpa-Solar systems*. Other actions need to be in place as well as enhanced knowledge exchange events during the traditional fairs (amaranto, flowers, nopal) and cultural activities that will reinforce consumer–producer relationships.

Three main components are envisaged to be implemented in the FAO project to build proximity in food networks of the *Chinampa* and *Milpa-Solar systems*, as shown in Figure 1. It considers three main components. The first is to strengthen the supply side. Its purpose is to upgrade the entrepreneurial and organizational capacities and marketing strategies of producer organizations. The second component is on the demand side, where the focus is on the analysis and advice on reforms to policies and regulations relating to public procurement and the provision of infrastructural facilities to enhance producers' participation in fairs and local markets (*tianguis* and mobile markets). Under this component, upgrading extension services as well as financial and business services should also be in place to better serve the particular needs of the producers within these heritage systems. Special technologies and skills are needed in particular to help in solving pollution problems associated with urbanization pressure, such as water pollution. Finally, the third component is to promote institutional innovations (FAO, 2016) that can assist in the construction of social networks and sustainable markets for sustainable products through the revision and improvement of the normativity for participatory guarantee systems and multiplying their implementation. The goal is to maintain the enhanced food quality attributes such as healthy food, identity and culture and heritage knowledge associated with the *Chinampa* and *Milpa-Solar systems*, support the livelihoods of the family producers and offer fresh and local products to some part of the inhabitants of Mexico City.

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The African Union continental strategy on geographical indications

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ABSTRACT

The African continent is blessed with rich natural resources and biocultural diversity that represent so many assets to be preserved and promoted, especially in a context of climate change and persistent food insecurity.

The African Union Commission has, in association with the regional economic communities (REC) and supported by international partners (FAO, EU), recognized the importance of and need for a continental strategy on geographical indications (GI) as a means of contributing to the various agendas and programmes for Africa in relation to agricultural development, in particular for the United Nations Sustainable Development Goals. The African strategy for GI will clearly also contribute to the implementation of the Comprehensive Africa Agriculture Development Programme (CAADP) and the Malabo Declaration approved by the African Union Assembly. The Agenda 2063 aspirations, adopted by the 24th African Union Assembly in 2015 as a continental plan for the next fifty years, serves as a model for the African GI strategy, to guarantee the transformation and sustainable development of the African continent for future generations.

The draft strategy for GI in Africa is a work in progress. It includes a policy framework, along with initial results and activities to serve as a basis for a more detailed action plan. At the end of the process, the final document “A continental strategy for geographical indications in Africa”, which will be approved by the African Union Commission, will comprise the context, policy framework and action plan for the development of geographical indications in Africa.

WHY A CONTINENTAL STRATEGY FOR GEOGRAPHICAL INDICATIONS

The African continent is blessed with rich natural resources and biocultural diversity that represent so many assets to be preserved and promoted, especially in a context of climate change, persistent food insecurity and poverty.

A continental strategy for geographical indication (GI) development in Africa is therefore relevant. Indeed, GIs refer to products with specific characteristics, qualities or reputation resulting essentially from their geographical origin. This differentiation can be attributed to the unique local features of the product, its history or its distinctive characteristics linked to natural or human factors, such as soil, climate, local knowledge and traditions.

GIs can be used as a tool for sustainable and rural development, as a result of their locally-tailored standard and multifaceted development approach, combining a market dimension (in relation to intellectual property rights [IPRs]) with linkages to public goods (heritage, food diversity, local knowledge and local genetic resources, socio-cultural identity, etc.).

GIs for food and non-food products represent an answer to enhance exchanges among stakeholders at international levels and thus to preserve and promote traditional products in local markets, as well as to better position African export products on international markets. In African countries, GIs can be used as a tool for agricultural value chain organization and promotion. They can be a tool to create income for farmers and other stakeholders in the value chain, such as small processing units and small traders, and therefore help them to face food-lean periods and food and nutrition insecurity.

A GROWING INTEREST FOR GEOGRAPHICAL INDICATIONS ON THE CONTINENT

Geographical indications are not new in Africa. From a legal point of view, they have been included in the African Intellectual Property Organization (OAPI) legal framework for intellectual property since the 1977 Bangui Agreement (revised in 1999) (OAPI, 1977).

A ministerial conference was organized in Ouagadougou, Burkina Faso, in 2005, on the initiative of OAPI. This conference gathered ministers responsible for intellectual property and agriculture ministers of OAPI member countries.¹ A declaration and an action plan on GIs (OAPI, 2006) were adopted, providing in particular the establishment of “GI National Committees” in each country and “GI Focal Points” in each Ministry of Agriculture, and the selection of “pilot products”. OAPI was mandated by the Member States to gather the means of implementation of the action plan.

Over the past 20 years a significant number of GI-related training and awareness-raising events have been organized in Africa or with the participation of representatives from Africa and such events have been increasing in these last years. The first events were organized by OAPI with the support of the World Intellectual Property Organization (WIPO) and the *Institut National de la Propriété Intellectuelle* (INPI) in relation to intellectual property aspects (OMPI/OAPI/INPI, 2009). The most recent ones are regional training organized in four countries (Benin, Burkina Faso, Ghana and Italy) between 2013 and 2014 by a consortium of African (OAPI and *Réseau des Organisations Paysannes et des Producteurs Agricoles de l'Afrique de l'Ouest* [ROPPA]) and international stakeholders (FAO, *Centre Technique de Coopération Agricole et Rurale* [CTA], United Nations International Development Organization [UNIDO] and le Réseau Echanges – Développement Durable [REDD]),² as well as those organized in Kenya, Uganda, Zambia, Zimbabwe, Botswana, Mozambique, Togo and Burkina Faso (in collaboration with the African Union [AU], European Union [EU], OAPI and the African Regional Intellectual Property Organization [ARIPO]) (EC, 2016). The aim was to build capacity of a pool of facilitators and trainers (almost 100 African men and women from 20 African countries) to support GI in the perspective of rural development.

¹ OAPI member countries are Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, Togo and Comoros.

² <http://www.fao.org/in-action/quality-and-origin-program/en/>

A number of technical assistance projects to support GI development have been implemented, among others:

- FAO technical assistance in Tunisia (2008–2009), to support the institutional framework on certification and development of various pilots (in particular the registered Gabès pomegranate and apple of Sbiba)³; in Guinea in collaboration with the Guinean Agronomic Research Institute (IRAG) and REDD (2011–2012)⁴; and in collaboration with Slow Food in Senegal, Côte d’Ivoire, Sierra Leone and Mali (2010–2012).⁵
- The *Projet d’appui à la mise en place des indications géographiques* (PAMPIG) funded by the French Development Agency (FDA), with OAPI in OAPI member countries (West and Central Africa) and the technical assistance of the *Centre de Coopération Internationale en Recherche Agronomique pour le Développement* (CIRAD) (2010–2014) that led to the registration of the three first GIs in sub-Saharan Africa: *poivre de Penja and miel blanc d’Oku* in Cameroon and *Café Ziama-Macenta* in Guinea (CIRAD, 2013a).
- In Tunisia: the *Projet Action-Indications géographiques* (PA-IG) project (2012–2017), funded by the FDA, in collaboration with the Ministry of Agriculture and with the technical assistance of CIRAD (CIRAD, 2013b); the *Projet d’accès aux marchés des produits agroalimentaires et de terroir* (PAMPAT) project (2013–2017) with the Ministry of Agriculture and Industry and UNIDO, financed by SECO Switzerland, and targeting a Harissa collective label (UNIDO, 2013).
- As part of the Association Agreement with the EU, the Algerian *Indications Géographiques-Appellations d’Origine* (IGAO) twinning project on the labelling of agricultural products (2014–2016) (Adecia, 2015).
- IFAD’s pilot initiative to support the establishment of three GIs for cocoa, coffee, and pepper in Sao Tome and Principe (IFAD, 2015).
- Swiss-Kenya Project on GIs to build capacity in human resource and develop GI legislation; the *World Intellectual Property Organization [WIPO]/Japan Patent Office [JPO]/Weitz Center for Development Studies [WCDS]/Kisii County Government [KCG]/Kenya Industrial Property Institute [KIPI]* Kisii Soapstone Project on Leveraging Market Potential of the Kisii Soapstone through Innovation and Intellectual Property Rights; the WIPO-JPO-KIPI Project on branding of the Taita basket in Kenya.
- *International Trade Center [ITC]/World Intellectual Property Organization [WIPO]* project for branding and protecting the Zanzibar clove.

Several studies on potential have been conducted and led to the identification of a great number of products, in particular:

- FAO identification of traditional and GI products in Guinea, and with Slow Food in Senegal, Côte d’Ivoire, Sierra Leone and Mali;⁶
- EU studies on coffee from Kenya (EC, 2013a), on cocoa from Cameroon (CTA, 2010), on the potential for marketing agricultural products of the African,

3 <http://www.fao.org/in-action/quality-and-origin-program/en/>

4 <http://www.fao.org/in-action/quality-and-origin-program/en/>

5 <http://www.fao.org/in-action/quality-and-origin-program/en/>

6 <http://www.fao.org/in-action/quality-and-origin-program/en/>

Caribbean and Pacific [ACP] countries using GIs and origin branding (EC, 2013b).

- The ongoing inventory developed by the international GI producers' association oriGIn (OriGIn, 2015).

Action research and case studies were also developed by a number of partners (FAO, CIRAD, Agronomic Research Institute of Guinea, Agronomic Research Institute of Togo, Swiss Centre of Scientific Research in Côte d'Ivoire, University of Abomey Calavi in Benin), in particular in Kenya on cocoa,⁷ in Togo on *riz de Kovié*,⁸ in the Niger on *violet de Galmi* onion,⁹ in Senegal on *miel de Casamance*,¹⁰ in Rwanda on the *Gisovu tea*¹¹ and in Mali on the *echalote du Pays Dogon*,¹² and ongoing studies on *sel du Lac Rose* in Senegal and on groundnut oil *Agonlimi* in Benin. Studies and research have also been conducted in South Africa by the University of Pretoria, the Western Cape Department of Agriculture and the South African Rooibos Council, among others.

There are, however, few concrete cases of marketing local products on the basis of the quality linked to the place. The branding of Ethiopian coffees according to geographical names (WIPO, n.d.) and the *Belle de Guinée* potato (a geographical name registered as a collective trademark [Agricultures, 2012]) can be highlighted here, as well as the three registered GIs by OAPI within the PAMPIG project (OAPI, 2012).

Regarding the African Union specifically, GIs are included in the Strategic and Operational Plan 2014–2017 of the Department of Rural Economy and Agriculture (DREA) of the African Union Commission (AUC), in Strategic Action 3.1 “Design and support implementation of programmes on rural infrastructure and value addition” with the following operational actions (African Union, 2013):

- 3.1.19 support awareness creation on GIs;
- 3.1.20 facilitate GIs policy harmonization.

The AUC, under the joint Africa-EU partnership, organized a series of events with the aim of sensitizing and informing the key players and actors in the agriculture sector within the regional economic communities (RECs) on GIs, as well as offering an opportunity for the actors in those regions to share experiences in this regard:

- a joint conference in Kampala, Uganda, in November 2011;
- joint national seminars (Uganda, Burkina Faso, Benin, Botswana, Kenya, Zambia, Zimbabwe, Mozambique and Togo);
- consultative training on GIs: Abuja, Nigeria, 2012; Midrand, South Africa, 2013; Nairobi, Kenya, 2013 and 2014 ; Gaborone, Botswana, 2014 ; and Maputo, Mozambique, 2014.

GIs have proven to be a tool to address many issues in relation to economic development (smallholders' empowerment, market access and added value, local economic development promotion), but also with preservation of biocultural diversity. As a result

7 <http://www.fao.org/in-action/quality-and-origin-program/en/>

8 <http://www.fao.org/in-action/quality-and-origin-program/en/>

9 <http://www.fao.org/in-action/quality-and-origin-program/en/>

10 <http://www.fao.org/in-action/quality-and-origin-program/en/>

11 <http://www.fao.org/in-action/quality-and-origin-program/en/>

12 <http://www.fao.org/in-action/quality-and-origin-program/en/>

of this discussion among key players, the importance of a continental strategy has been recognized, together with the need to build it on recent experiences of African countries on GIs, as the opportunities and challenges related to GIs are common to all African countries, while benefits from their development should spread out also to all African countries, in relation to economic, environmental, social and cultural aspects.

A POLITICAL MOMENTUM

A strategy on GIs at the continental level can be linked to existing institutional frameworks, at the international level and within the African Union vision.

As a result of the links between GIs from one side, and agriculture, food and biocultural diversity from the other, the ultimate goal of a GI continental policy framework would be to contribute to **food security and sustainable rural development** and to the **UN Sustainable Development Goals** (see Box 1).

In relation to the African integration, the Aspirations of Agenda 2063 adopted by the 24th African Union Assembly in 2015, and representing a continental plan for the next 50 years, represent an inspiring guidance for the GI policy framework, to ensure transformation and sustainable development of the African continent for future generations (see Box 2).

Such a GI policy framework will directly contribute to important objectives of the African Union, as formulated in the constitutive act (African Union, 2001):

- establish the necessary conditions that enable the continent to play its rightful role in the global economy and in international negotiations;
- promote sustainable development at the economic, social and cultural levels as well as the integration of the African economies;
- promote cooperation in all fields of human activity to raise the living standards of African peoples;
- coordinate and harmonize the policies between the existing and future RECs for the gradual attainment of the Union
- advance the development of the continent by promoting research in all fields, in particular in science and technology.

The GI policy framework will be directly in line with the AU Commission Priorities 2, and 5 to 6, reproduced in Box 3.

Moreover, the continental GI strategy will definitely contribute to the Comprehensive Africa Agriculture Development Programme (CAADP) (see <http://pages.au.int/caadp/about>), which represents a growth-oriented agricultural development agenda, to create the wealth needed for rural communities and households in Africa to prosper. Among the four CAADP pillars, the GI policy framework will particularly contribute to pillars 2 and 4 in relation to trade-related capacities for market access and agriculture research and technology dissemination (see Box 4).

The 23rd Ordinary Session of the African Union Assembly held in Malabo (June 2014) recommitted to the CAADP principles and goals and defined a set of targets and goals – referred to as the Accelerated Agricultural Growth and Transformation Goals 2025. Specifically, the Malabo Declaration (see Box 5) outlines seven commitments that are geared towards fostering agricultural growth and transformation. The continental GI strategy will contribute to all this approach, and in particular to commitments 4 and 5.

Box 1: The 2030 Agenda for Sustainable Development – the 17 Sustainable Goals

1. End poverty in all its forms everywhere.
2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
3. Ensure healthy lives and promote well-being for all at all ages.
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. Achieve gender equality and empower all women and girls.
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10. Reduce inequality within and among countries.
11. Make cities and human settlements inclusive, safe, resilient and sustainable.
12. Ensure sustainable consumption and production patterns.
13. Take urgent action to combat climate change and its impacts.
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Source: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Finally, the continental GI strategy corresponds to two of four key result areas of the Department of Rural Economy and Agriculture (DREA)¹³ (see Box 6) and is directly contributing to the DREA strategic and operational plan (2014–2017) (African Union, 2013), not only with regard to the above-mentioned Strategic Action 3.1 “Design and

¹³ DREA Mandate: The African Union Commission’s (AUC) Department of Rural Economy and Agriculture (DREA) was established with the objectives of promoting agricultural and rural development and ensuring food security and nutrition for Africans. It coordinates policies and programmes towards achieving sustainable development and improved livelihoods for the population, by ensuring sound environmental and natural resources management including disaster risk reduction and adaptation to climate change. DREA’s anticipated outcome and expected outputs elaborated in its Strategic Plan are to support the processes to expand agricultural production, developing agro-processing and business sectors, increase market access and attain Africa’s collective food self-sufficiency and nutrition through promotion of smallholder agriculture – a mandate in line with DREA’s mission to develop and promote the implementation of policies and strategies aimed at strengthening African agriculture and sound environmental management by working with AU Member States, RECs, African citizens, institutions and other stakeholders.

Box 2: The 2063 Agenda “Aspirations for the Africa we want”

1. A prosperous Africa based on inclusive growth and sustainable development.
2. An integrated continent, politically united and based on the ideals of Pan-Africanism and the vision of Africa’s Renaissance.
3. An Africa of good governance, democracy, respect for human rights, justice and the rule of law.
4. A peaceful and secure Africa.
5. An Africa with a strong cultural identity, common heritage, shared values and ethics.
6. An Africa whose development is people-driven, relying on the potential of African people, especially its women and youth, and caring for children.
7. Africa as a strong, united and influential global player and partner.

Source: http://www.au.int/en/Agenda2063/popular_version

support implementation of programmes on rural infrastructure and value addition” (in particular the two operational actions related to GI as mentioned before and the one on supporting regional value chain development efforts), but could also develop linkages with (and benefit from) the following strategic actions:

- 1.3 Promote and facilitate the generation and dissemination of knowledge, innovation and technology for agricultural transformation.
- 2.1 Promote measures to enhance access of women, youth and people with disabilities to land and other agricultural productive assets.
- 2.2 Support design and implementation of projects under the Fund for African Women on agribusiness.
- 3.2 Support programmes specifically designed to assist women, youth and people with disabilities undertake value-addition of agricultural products.
- 3.3 Set up and implement communication and advocacy campaigns and thematic media plans to raise awareness and ensure stakeholders’ information and citizens’ involvement and ownership of agribusiness programmes for women, youth and people with disabilities.
- 4.1. Promote/facilitate sustainable management of the environment and natural resources, including water, land, biodiversity, etc.

It will be also relevant to ensure complementarity between the continental GI strategy framework and other continental strategies, and in particular with the ecological organic agriculture (EOA) initiative, as the organic voluntary standard shares common characteristics with the GI approach with regard to quality approach, certification scheme and marketing strategy.

Box 3: The eight AUC priorities, 2014–2017 Strategic Plan

1. Promote peace and stability, including regional initiatives, good governance, democracy and human right as a foundation for inclusion, security and the development of the continent and its people.
2. Expand agricultural production, developing the agro-processing and businesses sectors, increase market access and attain Africa's collective food self-sufficiency and nutrition through promotion of smallholder agriculture, sound environment and climate change and natural resource management.
3. Promote inclusive economic development and industrialization through the acceleration of infrastructure development projects that will aid economic integration and utilization of the continent's mineral and other natural resources.
4. Build Africa's human capacity through the prioritization of primary health care and prevention; education, skills development and investment in science, research and innovation, access to clean water and sanitation with inclusion of the vulnerable groups.
5. Mainstream the participation of women and the youth in all priorities and activities of the Union and the continent.
6. Implement strategies of resource mobilization, with special emphasis on alternative sources of funding, and/or additional funding to enable Africa to finance its programmes and development.
7. Strengthen a people-centred Union through active communication of the programmes of the African Union, the branding of the Union and participation of Member States and other stakeholders in defining and implementing the African agenda.
8. Strengthen the institutional capacity of the AUC, the RECs and other organs, and its relations with strategic and other partners.

Source: <http://www.au.int/en/AUC/dcpauc/priorities>

Box 4: The CAADP four pillars

- Pillar 1: Extending the area under sustainable land management and reliable water control systems.
- Pillar 2: Improving rural infrastructure and trade-related capacities for market access.
- Pillar 3: Increasing food supply, reducing hunger, and improving responses to food emergency crises.
- Pillar 4: Improving agriculture research, technology dissemination and adoption.

Box 5: The AU Malabo Declaration

1. Recommitment to the principles and values of the CAADP process.
2. Recommitment to enhance investment finance in agriculture:
 - uphold 10 percent public spending target;
 - operationalization of Africa Investment Bank.
3. Commitment to Zero Hunger – Ending Hunger by 2025:
 - at least double productivity (focusing on inputs, irrigation, and mechanization);
 - reduce post-harvest losses at least by half;
 - nutrition: reduce stunting to 10 percent.
4. Commitment to halving poverty, by 2025, through inclusive agricultural growth and transformation:
 - sustain annual sector growth in agricultural GDP at least 6%;
 - establish and/or strengthen inclusive public–private partnerships for at least five priority agriculture commodity value chains with strong linkage to smallholder;
 - create job opportunities for at least 30 percent of the youth in agricultural value chains;
 - preferential entry and participation by women and youth in gainful and attractive agribusiness.
5. Commitment to boosting intra-African trade in agricultural commodities and services:
 - triple intra-Africa trade in agricultural commodities;
 - fast-track continental free trade area and transition to a continental common external tariff scheme.
6. Commitment to enhancing resilience of livelihoods and production systems to climate variability and other shocks:
 - ensure that by 2025, at least 30% of farm/pastoral households are resilient to shocks.
7. Commitment to mutual accountability to actions and results:
 - through the CAADP Result Framework – conduct a biennial agricultural review process.

Source: http://pages.au.int/sites/default/files/Malabo%20Declaration%202014_11%202026-.pdf

THE FORMULATION PROCESS OF THE CONTINENTAL GI STRATEGY

The continental strategy process relies on the involvement of African key players: at continental and regional levels: the African Union and the RECs; at national and local levels with the ministries and institutions in charge or involved in GI issues, as well as research and development actors.

In order to ensure transparency and a consultative process, the GI strategy has been developed through the following steps:

1. The AUC, under the joint Africa-EU partnership, organized consultative training on GIs in Nairobi, Kenya, in November 2014. The main output of the training

Box 6: DREA key result areas

1. Sustaining the implementation of CAADP priority programmes as an instrument to boost agricultural production and productivity, food and nutrition security, and eliminating hunger and reducing poverty.
2. Design and implementation of programmes on agribusiness, including on improved access to productive resources and capacity of women and youth and other disadvantaged social groups.
3. Design and implementation of programmes for harnessing rural infrastructure for market access and trade in agricultural products.
4. Enhanced implementation of priority programmes on environment and natural resources and climate change.

Source: African Union, 2013.

was the first draft outline for a continental strategy on GIs. The DREA contacted FAO headquarters in 2015 to organize the technical support to draft the strategy.

2. The initial workshop was held in January 2016, at FAO, Rome, to agree on the overall objectives of the strategy and the formulation process, in the presence of the AUC representative in charge of the GI activities, of the FAO staff in charge of the Quality and Origin Programme, of the European Commission representatives in charge of international relations and GIs for ACP countries, and of the Groupe de Recherche et d'Echanges Technologiques (GRET), the French non-governmental organization contracted by FAO to facilitate the formulation process.
3. Official letters were sent by the AUC to OAPI and ARIPO to officially engage these organizations as key players in the strategy formulation (beginning of March).
4. A first proposal of the strategy was drafted by a working group made up of AUC, FAO and GRET representatives (February–March 2016).
5. E-consultations were organized in April 2016: around 100 experts and stakeholders completed the draft proposal to revise or complete the background information and give opinion about the content.
6. A validation workshop was held early June 2016: the consolidated proposal finalized through e-consultation was presented, discussed and approved by key stakeholders and representatives. The workshop also identified the first elements to be included in the action plan.

THE WAY FORWARD

A technical workshop was thus organized jointly by the African Union and FAO, with the support of the European Union and the technical organization of GRET and the *Plateforme Nationale des organisations Paysannes et des Producteurs Agricoles* [PNOPPA],

in Cotonou, Benin, 31 May–2 June, to validate this strategy on a technical level before its political approval by the African Union. During the Cotonou workshop, a 2017–2022 action plan for GI was formulated, which will be discussed for implementation by the African Union.

The strategy discussed by the various experts (by e-consultation), and then during this validation workshop held at the Cotonou seminar, is a robust document that will now be amended.

The strategy will then be circulated to workshop participants and more widely to the African network set up by e-consultation.

It will also be submitted officially to the ARIPO and the OAPI to seek their cooperation, as well as to African Union member states.

The work plan backed by this strategy will be outlined bearing in mind the work done at the Cotonou seminar. It will be the subject of an e-consultation and technical validation at a workshop to be organized by the end of the year by the African Union.

The strategy document and its work plan will then be officially adopted by the African Union, so that resources can be sought and allocated to implement the strategy and its action plan, particularly the pilot projects.

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The role of sustainable HORECA for sustainable lifestyles – identification of challenges and future work

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ABSTRACT

Internationally there is increasing interest in short food supply chains and local and organic food as part of a wider concern with sustainability. This is strongly evident in both commercially oriented food service, where it is often associated with sustainable tourism endeavours, and in institutional catering, often in connection with sustainable public procurement initiatives. Proponents stress environmental benefits as well as the health and nutritional value of high-quality organic food and re-localized food production and consumption, plus the opportunity for food education, especially in school meal settings. This paper looks at changing policies and practices against a background of rising digitalization and the blurring between retail and food service channels. It will consider long-term strategies for developing sustainable HORECA, cooperation between procurers and smaller suppliers, and community involvement.

CATERING AND HOSPITALITY – IT’S BIGGER THAN YOU THINK

Broadly speaking, people eat at home – or – they eat out of home. Catering and hospitality can be said to cover everywhere that people eat out of home. As an economic activity, it is commonly classified according to categories that are largely similar around the world (see Table 1); this allows statistical reporting and analyses across borders to a certain degree.

Catering and hospitality also go by the term food service, or HORECA (hotels,

Table 1: Food service-related activities according to the International Standard Industrial Classification (ISIC), the Nomenclature of Economic Activities (NACE) in the European Community, and the Australian and New Zealand Standard Industrial Classification (ANZSIC)

ISIC	Classification of economic activities	NACE	ANZSIC
55	Accommodation	55	44
551	Short-term accommodation activities		
	Hotels and similar accommodation	55.1	440
551	Holiday and other short-stay accommodation	55.2	440
552	Camping grounds, recreational vehicle parks, trailer parks	55.3	440
559	Other accommodation, including student residences, school dormitories, workers' hostels, boarding houses	55.9	440
56	Food and beverage service activities	56	45
561	Restaurants and mobile food service activities	56.1	451
562	Event catering and other food service activities	56.2	451
563	Beverage serving activities	56.3	452-3

restaurants, catering), though the nature of the sector is far more complex than these three simple words might suggest. Accommodation with food service covers a restaurant in a hotel, a mini-bar in a motel room, a kiosk in a campsite, a vending machine in a youth hostel and a bar at a trailer park. Restaurants range from fine dining to fast food takeaways, but also food trucks, street food and food preparation at market stalls. Catering can take place in an institutional setting such as corporate or business canteens, in social welfare settings such as in the care sector in hospitals or clinics, or in an education setting from kindergarten through schools to university. Accordingly this may even be referred to as lifecycle catering: catering for human groups at various lifecycle stages. Slattery (2002) divides the hospitality industry into free-standing hospitality business (e.g. hotels, restaurants and bars), hospitality in leisure venues (cultural, sport, music, etc.) and in travel venues (land, air, sea), and subsidized hospitality (e.g. homes, prisons, military).

Kottila (2010) includes HORECA in food chain stakeholders while Nuutila and Kurppa (2016) as part of the food chain. In research (e.g. Whatmore, 1995; Ericksen, 2007), HORECA is often not even mentioned as part of the food system and in statistics (e.g. Meredith and Willer, 2016), it is often included in food markets or retail, or the data are old and incomplete. Nevertheless, HORECA is an important part of the food system, for example in EU28, in 2014 the average annual household expenditure for catering was 6.7 percent and for hotel and restaurant services 8.2 percent, and there were 1.5 million outlets providing food and beverage services (Eurostat, 2016a). The hospitality industry is a significant employer, it has a substantial growth potential and it generates remarkable tax revenues (Mara, 2016), it's highly varied legal trading forms (leases, concessions, ownership, etc.) notwithstanding. Although it is a volatile market, being linked to economic cycles, it is consistent and continues to claim at least one-third and up to one-half of developed market currencies spent on food. In this paper we consider food service overall, focusing on the part eating out of home plays in a sustainable food system. Sustainability is an issue across all types of food service operations and there are many varied individual approaches (Strassner, 2015).

Table 2: Simplified representation of the transformation happening within a food service operation

Input	Output
energy	fuel use, emissions
water	wastewater
air	waste air
energy, air, water	heat and refrigeration
food ingredients	meals, food loss, food waste, leftovers incl. fryer oil
non-food articles	packaging, containers
people	development? health? well-being? skills?
furniture appliances	materials waste
real estate	construction and demolition waste
financial resources	profit, loss, taxes, debts

Source: Roehl and Strassner (2012).

SUSTAINABILITY IN HORECA

Citizens are increasingly interested in the production method of their food and what it contains or does not contain, and that is leading to ecological and ethical consumption and awareness of safe and healthy food. Guests place an increasing emphasis on eco-social values. The HORECA industry has responded to this development and is supporting it along with the trend of locally produced food. The global demand of moving towards a circular economy and promoting high-quality recycling (EREP, 2016) is also exerting influence on the consumption of organic food. Yet the private sector cannot be guided towards sustainability and use of organic produce in other ways than by consumer trends, taxation and legislation. The public sector is the major consumer in EU representing 14 percent of the EU gross domestic product (EC, 2016) and therefore EU has legislation for public procurement (Eur-Lex, 2014) and recommendations for more sustainable green public procurement (GPP) (EU, 2016). These include a special product sheet for catering and food with specific instructions on how to change the procurement and kitchen operations to be more sustainable (EU, 2014). In both documents organic food and its production are indicated as an example of a sustainable method of procuring, preparing and serving food. The consumption of organic produce is also increasing in the HORECA sector (Meredith and Willer, 2016) but, because it is usually not included in official organic controls, the statistics are incomplete in most countries.

In the past, food service operations, much like all other operations, focused on improvements and developments within the boundaries of their operations. With the increasing attention to sustainable development, the inputs upstream and the outputs downstream are being brought into the sphere of operation responsibility and hence actionability (Strassner and Roehl, 2014). A typical food service operation takes a number of inputs and transforms these to a number of outputs (Table 2). In matters of sustainability, the focus of interest is currently mainly on: (i) food, i.e. food quality according to various criteria such as short chain, local, Fair Trade and organic; (ii) emissions (climate change, with CO₂e reduction as a goal, hence a proliferation of climate menus and CO₂e calculators), this links with food issue mainly via meat; and (iii) food losses within operations but especially at the end of the operation, i.e. the guest's food waste.

FOOD QUALITY AND ORIGIN IN HORECA – CURRENT DEVELOPMENTS

Too often the sustainability of the food chain and food is approached with only CO₂ emissions, eutrophication and nutrition (e.g. Vorne and Patrikainen, 2011) and other environmental aspects as well as social, ethical (animals, employees) and economic aspects are disregarded. As a result of a recent meta-analysis of four key sustainability metrics (productivity, environmental impact, economic viability and social well-being) and a comparison of organic and conventional agricultural systems, Reganold and Wachter (2016) developed an assessment illustrating twelve sustainability areas. They conclude that: (i) conventional exceeds organic in yields; (ii) organic and conventional are equal in nutritional quality and total costs; and (iii) organic exceeds conventional in profitability, minimizing water pollution, biodiversity, minimizing energy use, soil quality, minimizing pesticide residues, reduced worker exposure to pesticides, the employment of workers and ecosystem services. Organic food systems can provide sufficient food if consumption patterns change towards less resource-consuming products (Schader, Stolze and Niggli, 2014). A study in the United Kingdom estimated that converting to organic production would reduce the external environmental costs of agricultural production by 75 percent (Pretty *et al.*, 2005).

The sustainable performance of HORECA operations derives from official guidelines, such as GPP (EU, 2016), governmental programmes and goals such as the National Plan of Sustainable and Health Gastronomy of Costa Rica (Azofeifa, 2016) and also by the demand coming from the guests or customer companies. The GPP food and catering services toolkit deals with: (i) use of pesticides and fertilizers; (ii) soil degradation, forest destruction and loss of biodiversity; (iii) GMOs; (iv) intensive husbandry, fishing and aquaculture; (v) energy and water consumption and waste generation in manufactured food production; (vi) additives used in processed food; and (vii) waste generation. Considering food sourcing in particular for a food service operation is especially important because it enables consideration of the full length further upstream all the way to the farm and its input. Typically a number of food quality criteria are being included in the technical documents for public procurement tenders, such as those of the City of Munich in Germany (Figure 1). Such criteria may include short chain stipulations often with the aim of supporting rural development and providing economic support for small, medium and micro enterprises (SMMEs). The inclusion of organic ingredients, foods and meals plays a particularly prominent role.

ORGANIC FOOD IN HORECA

There are many such examples of food service operations using or being required to use organic products. Organic agriculture and food production provide a useful study object, inasmuch as they can be used as a model linking production and consumption and be followed through a clear organic food value chain (such as in Figure 2) or even observed as an organic food system (Kahl, 2015). In the following section a few cases will be briefly presented.

Organic HORECA in Copenhagen

The Copenhagen City Council decided in 2001 that the public meal service in the Municipality was to convert to organic food products and that by 2011 at least

1. Minimum 10 percent of all food of organic quality
2. Minimum 30 percent of all food from local production
3. Minimum 30 percent of all food or a single animal species with animal welfare standard
4. Marine fish exclusively of Marine Stewardship Council quality
5. Coffee and tea exclusively of Fair Trade quality

Figure 1. The City of Munich's requirements of caterers

Source: Strassner and Roehl (2016).

75 percent of the food used in the public meal service should be of organic origin. In 2007, this goal was increased to 90 percent to be reached by 2015. The Copenhagen House of Food (Københavns Madhus) was appointed to be the driving force behind the conversion (Københavns Madhus, 2015). In spring 2016, the Municipality of Copenhagen celebrated that 88 percent of the food produced for public meal services was organic produce (City of Copenhagen, 2016).

The Copenhagen House of Food has estimated that the Municipality of Copenhagen serves approximately 120 000 meals to 70 000 guests in 900 institutions prepared by 1 750 kitchen staff members daily. A total of 10 700 tonnes food – of which 9 475 tonnes are organic – is produced (Københavns Madhus, 2015). According to the Copenhagen House of Food, the formula for this astonishing shift is clear: political decisions supported by the institutional staff, high professionalism and drive. More organic food in public kitchens is anticipated to have a number of advantages: it is beneficial for the environment, contributes to optimization of the kitchen processes that can reduce food waste, creates more focus on meal quality and provides better and healthier food to the user, while also creating greater job satisfaction for the kitchen staff. The task of making tangible organic progress through conversion in the public kitchens was given to the Copenhagen House of Food and this was set about by a process that the Copenhagen House of Food calls “conversion of heads and saucepans”, because it is not sufficient just to replace conventional products with organic products, as that was estimated to increase the costs by 20–35 percent. Instead, by converting the production in the kitchen and the consumption, including a change in the nutritional composition, the final outcome was a balanced diet plan with seasonal organic produce, with no additional expenditure. The reason for the success is understood to be the political decision behind and the investment in the conversion process. Furthermore, the public kitchens participating in this conversion are required to be willing to change, but also curious and professional. In some cases ready-to-use products, canned preserves, frozen peas and bouillons must be replaced by fresh, seasonal ingredients and self-made stock. The conversion may also require extensive examination of the whole process including waste, budget, economy and introduction of entirely new products and recipes. The final product may include higher culinary quality, but also professional satisfaction and pride in the kitchens.

The Danish Minister for Food and Agriculture announced a new policy regarding organic food in 2011 entitled: “A strong new ecology policy - towards a green conversion” and in 2012 a more detailed Organic Action Plan 2020 was presented. In order to strengthen the green conversion a number of initiatives were started and funded by the government.

These initiatives were divided into six categories: (i) governments must take the lead; (ii) ecology after 2013; (iii) farmer reorganization; (iv) product development and innovation; (v) sales and marketing; and (vi) research and development. This multipronged strategy was considered more effective than, for example, farmer reorganization alone.

Organic HORECA in Södertälje, Sweden

Organic food is common in public catering. In the summer of 2001, Ekocentrum in Sweden carried out an investigation on the use of organic food in public catering. Results showed that 84 percent of the communities have organic products in their purchase contract; 40 communities had more than 75 percent of their caterers serve organic food from time to time (Enfors, 2001).

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process leading to the creation of a diet policy to guide the direction of the work within food service was set in motion. Within four years, in 2010, the diet policy was adopted by the city council. In the policy it is stated that food “...shall be produced under ethical conditions and with as little harm to the environment as possible.” It also states that the municipality shall whenever possible purchase organic food and promote locally sourced and produced products. In a further step, Södertälje municipality became a partner in the BERAS implementation project. The Diet Unit was given the task to develop criteria for, and then implement, the concept called Diet for a Green Planet. Continuing till today the BERAS project produces research that shows that food produced on ecologically regenerative agriculture farms can help revive the Baltic Sea (Beras, 2013). By 2014, around 90 percent of all professional kitchens in kindergartens, schools and elderly care homes are fully equipped, able to prepare and cook food from raw ingredients. Today (2016) Södertälje municipality has 91 restaurants in schools, kindergartens and elderly care homes. There are 24 000 meals served every school day with a 60 percent organic level at no increased cost per meal. The principles of Diet for a Clean Baltic have also been tested out in cities in Poland, Lithuania and Spain (Nordlund, 2015).

Organic HORECA in Seoul

Sustainable practices are implemented in food service operations in the Republic of Korea and are well-received by guests, according to a study by Ju and Chang (2016). This includes organic restaurants (Oh, 2008) and also school meals (Park, Ahn and Choe, 2013). The latter have been crucial to nutrition and health of school-aged children in the Republic of Korea. In 1953 a school lunch service was first introduced nationally (Yoon, Kwon and Shim, 2012). The municipality of Seoul in the Republic of Korea has more than 10 million inhabitants of which a number are concerned about sustainable practices. Several schools have started to use products from environmentally-friendly agriculture (also termed eco-friendly), which includes organic as one of three official schemes along with pesticide-free and low-pesticide agriculture. In October 2008, a programme for organic school meals was launched, which piloted with 62 schools in March 2009. By March 2015, six years later, 723 schools were taking part in the programme, which necessitated the construction of three logistic centres to a value of USD27.5 million (Sohn, 2016).

Organic HORECA in Finland

Finland is one of the few countries that offer warm meals to day-care centre and school children up to the age of 18 years (OPH, 2015; Mikkola, 2008) and that gives a unique possibility to serve organic produce to a remarkable part of the population. Although the organic food system is developing in Finland according to all parameters, it is still lagging behind the best performing EU countries (Willer and Lernoud, 2015). There are many challenges that prevent the development of the organic food sector in Finland such as the poor cooperation among the actors of the food chain, unfair division of power among the food chain stakeholders (Nuutila and Kurppa, 2016a) and also the consumers’ trust in the quality of conventional Finnish produce that keeps the organic markets small (Nuutila and Kurppa, 2016b).

A national innovation: free school meals

The use of organic produce in the Finnish catering sector is increasing and in 2015 one-third of the professional kitchens used organic ingredients weekly, more in the private sector and less in the public sector (Pro Luomu, 2015). The share of organic produce in public kitchens was approximately 5 percent (in kg) in 2014 (Pro Luomu, 2014). Since the use of organic ingredients by the professional kitchens is not controlled by the authorities, there are no precise data available. There are 850 000 scholars entitled to free school meals. Additionally, some 47 000 children taking part in before- and after-school activities get to enjoy a snack. Some education providers also offer a free snack to children taking part in school clubs. (OPH, 2015). Public catering has a long history in Finland and free school meals have been served for scholars up to upper secondary school and vocational school level since 1948 (OPH, 2015). This is in line with the Nordic welfare model that addresses tax funds to the common good maintaining a welfare society with high social security (Kautto *et al.*, 1999; Miettinen, 2013; Norden, 2013).

Organic food in municipalities

Finland has 313 municipalities (from 1 285 up to 628 208 inhabitants) (Local Finland, 2016) and they provide over half of all meals eaten outside homes. One-third of the population uses public catering services on weekdays, and public meals reach all Finns in some part of their lives (Perälähti and Kumpusalo-Sanna, 2015). School meals provide an important channel for exerting influence on the food choices of citizens (Risku-Norja and Mikkola, 2014) and are therefore also an important channel for organic education. Along with the aforementioned challenges that organic development is facing, the most notable ones for the public procurement are the poor and uneven availability and selection of the organic products and especially in further processed products (Kottila, 2010) and the higher prices compared with conventional alternatives (Risku-Norja and Løes, 2016). Although the use of organic produce in professional kitchens is developing slowly, according to Nuutila (2015), the employees of the public kitchens are the most positive actors in the Finnish food chain for organic production and products and the positivity was even higher in the public sector than in the private sector. The kitchen personnel are well educated: cooks have a vocational school degree, foremen have an applied sciences level degree and the biggest municipalities have nutritionists with a university degree (Mikkola, 2008; Nielsen *et al.*, 2009). There is no precise data of the use of organic produce in the private sector. The use of organic ingredients is expected to increase, but the availability is not good enough. According to a survey, 39 percent (n=657) of chefs would like to buy more organic produce, especially peeled and cut vegetables. There is a growing interest towards organic produce because they are regarded as a tasty, safe, ecological and ethical choice (Pro Luomu, 2016).

Menu engineering

The daily school meals are composed of a warm main course, a selection of cut and grated fresh vegetables, bread and spread and milk. Depending on the nature of the main course, fruits and sometimes dessert is served. There are two choices for the main course; one is

(ovo-lacto-)vegetarian. The main ingredient for the other main course choice is red meat, poultry, fish or vegetables. Soup is served once a week. According to the school food guidelines (VRN, 2008), the school meal needs to provide one-third of the daily energy intake and it needs to be nutritionally balanced. A government-funded organization created a “step-to-step” programme to increase the use of organic produce in professional kitchens (Portaat Luomuun, 2016). With its six steps, the customers can recognize the share of daily or weekly used organic products. There is also a register of organic food serving outlets, but the data are not complete as the programme is on voluntary basis.

Official goals and challenges

The Finnish Government has set goals for the development of the organic food chain as part of the sustainable food system (YM, 2005; VN, 2009; MMM, 2012). The current “Organic 20/2020” programme means that in 2020: (i) 20 percent of the agricultural land will be under organic production; (ii) the national production will be sufficient for domestic markets; (iii) the sales of Finnish organic products will triple in retail and catering; and (iv) 20 percent of the food served in day-care centres and schools will be organic (MMM, 2014). The goals are reachable with several actions taken in the Finnish food system. The strongest instruments are taxation (such as pesticide and nitrogen taxes), legislation and higher national organic subsidies. Additionally the government and the municipalities could set a specific organic school meal subsidy (Nuutila and Kurppa 2016b) in the same way that EU sponsors school milk and fruits to the schools. Menu engineering gives a kitchen-level possibility to increase the share of organic produce either by replacing the most expensive ingredients (e.g. meat) with the less expensive organic and seasonal vegetables or by replacing part of the meat with root vegetables in stews, ragouts and soups (Ekocentria, 2016). The domesticity of food and its production is well noticed by the authorities (MMM, 2014; VN, 2014) and the organic growth as part of the development of the national food chain (VN, 2010, 2011). It is true that the organic food system offers a possibility to improve national food security. In Finland it is also important to start using organic wild berries and mushrooms because the world’s largest non-agricultural organic area is in Finland (11.6 million ha) (Pro Luomu, 2016) providing certified organic berries and mushrooms to the markets.

Organic HORECA in Italy

In Italy, a legal framework exists to support organic, traditional and local food consumption in food procurement. To guarantee the promotion of organic and quality food production, the Italian Parliament passed a law in 1999 (National law no. 488 of 23 December) in which it was established that the public institutions that manage the school and hospital food service have to provide in the daily menu for organic, typical and traditional food products, and those of geographical indication (Protected Designation of Origin [PDO]; Protected Geographical Indication [PGI]) as well, taking into account dietary guidelines and recommendations in the composition of the diet.

The national law represented the starting point of a significant change in the school food service in Italy. Currently, several regions (Emilia-Romagna, Basilicata, Tuscany, the Marche, Lazio, Friuli Venezia Giulia, Veneto, Trentino, Umbria) have their own laws in

which the use of organic and local food products in school canteens and the hospital food service is promoted and, in some cases, also financially supported.

There are many municipalities where organic and local food products are provided in the school canteens. However, the situation is highly differentiated. There are school canteens that have only one organic food product in the list of the foodstuffs used; others provide some organic food products and, finally, others provide a complete organic menu.

According to the BioBank report (Mingozzi and Bertino, 2015), the school canteens in Italy that provide at least one organic food product were 1 249 in 2014. The number of meals provided in these canteens amounted to 1 230 000. In 2010 there were 872 so-called organic canteens; this means an increase of about 43 percent in five years. Food products provided are mainly fruit and vegetables, but also yoghurt, milk, eggs and oil are included.

During the economic crisis, some municipalities have decided to save money by discontinuing the provision of organic food in school canteens. However, the number of these canteens has been exceeded by that of newly organic canteens, thus resulting in a net increase.

In about 23 percent of these organic canteens, organic ingredients represent a minimum of 70 percent of all the raw materials used for the preparation of the menu. They are mainly located in Northern Italy (71 percent), while 18 percent are in Central Italy and 11 percent in Southern Italy.

Among the municipalities, the city of Rome characterizes a success story. Every day in Rome the school canteens provide about 150 000 meals. About 70 percent of all the food products provided are from organic agriculture. Fruit and vegetables are 100 percent organic, as well as bread. Recently, some types of fish have been introduced, such as trout fillet from organic aquaculture. In 2014, more than 60 percent of the food products in school canteens were from producers (farms, livestock) located less than 300 km from Rome. Some products (e.g. bananas) are of Fair Trade quality.

The Emilia-Romagna region was one of the first Italian regions to have its own legislation specifically addressed to support food education and the public food service of high quality (Regional law no. 29, 2002, 4 November). The approach of the Emilia-Romagna region is grounded on the educational role of the school food service, which presents an opportunity to promote well-being and health from an early age and to orient consumers towards sustainable consumption.

The activities performed by the regional administration from 2002 were to:

- provide widespread information to the municipalities;
- organize training courses for food service operators;
- involve schools;
- establish synergies between different intervention areas (agriculture, health, regional agency for purchasing).

Moreover, the Emilia-Romagna region set up a permanent information service to:

- monitor the food service provided by the municipalities;
- give information and/or advice to local bodies managing food service activities, schools, food service companies, parents, organic operators, about foodstuff price and availability, menu, tenders, legal and administrative aspects, etc.;
- release a newsletter with information, events and news.

The regional law is applied by 80 percent of the school canteens in Emilia-Romagna to different extents: in 30 percent of the cases organic food products represent 80–90 percent of the food products used; 25 percent of the school canteens use only more inexpensive organic food products; finally, 25 percent make infrequent use of organic food products.

Organic HORECA offers some lessons for sustainability in HORECA

These brief cases and many more like them have a number of factors in common that may be useful for other initiatives to promote sustainable development in the HORECA sector.

A supporting environment made up of growers, educators, networks and consultants

Within the organic food system, these cases have a supporting environment in each location or region. There is a strong participation of various groups, such as organic grower associations that actively support the food service channel as a (further) channel for organic products, not just the retail channel. There are also trainers offering organic education and training specifically for food service professionals. Additionally, networks of practitioners or partners share experience on their food service operation's sustainability journey, and consultants specialized in this niche sector actively and directly support the market development and/or accompany it. Thus there are many, many people in many functions and with many varying perspectives and skills all supporting these transitions.

Integration into dietary standards, procurement guidelines, and more

Viewed through a food systems lens, reinforcing loops can be observed, i.e. when small changes become big changes, changes that bring about more changes. For example, after some time sustainability criteria (including organic) were integrated in the German quality standards for school meals. These quality standards were the first of a series so that once the criteria had been integrated, they were moved through the entire series, i.e. into the standards for kindergarten meals, business meals, meals on wheels, homes, hospitals and clinics. Such criteria can also be found in green hospital strategy papers, procurement guidelines, e.g. for student unions, how-to guidelines for school meals, cookbooks for food service operators, as well as educational material for teachers and pupils at different levels.

HORECA – producer partnerships

The interest in organic produce for food service operations is providing an opportunity for direct cooperation between food service operations and small suppliers, between procurers and small producers. There are farm-to-restaurant, farm-to-school, farm-to-college, farm-to-hospital, farm-to-ice cream-parlour, farm-to-youth hostel, farm-to-business canteen cooperative partnerships in numerous countries around the world. Stakeholders appreciate the short chain opportunities, such as the BioMacher Initiative “Wir machen Bio” (BioMacher, 2016).

A variety of certification schemes

The organic food system inherently provides an assurance and control system, given that it is defined and regulated in 86 countries around the world (Strassner, Kahl and Paoletti, 2015), though very few have formal regulations for organic use in food service. It is a food

system active in the communication and promotion activities, inter alia about organic quality. This is what enables public procurement to include organic as a quality criteria, because it can be followed through the value chain and it is unambiguously defined. Moreover, there are many further seals and programmes, especially in the tourism sector, which include organic food quality among their sustainability criteria. The sum total of these very varied initiatives is a wide base of experience both in developing such labels, rolling them out, promoting and monitoring them.

CHALLENGES AND FUTURE WORK

Nevertheless, there are a number of critical obstacles to sustainable HORECA and their integration into sustainable lifestyles of citizens worldwide.

Technical innovation needed for small-scale activities

For food service operations starting the journey of sustainability, there is a challenge of finding suitable products, ready to use in professional kitchens. Food service operations are used to ready-to-use food service products that are calibrated, uniform, pre-processed products. Farms or other small suppliers often have no resources to bridge the gap between products off the field and food service needs. Food services, having tight budgets, often released those human resources that once washed lettuce and peeled potatoes and hence also do not have the resources. Technical innovation and advancement for small-scale actors is needed, those processing innovations that better bridge the gap between producers and professional kitchens.

The (changing) social practice of eating

Lifestyles are changing, especially with regard to mobility, demography and digitalization. Eating is part of diet, which is part of lifestyle. Viewed as a social practice, eating is changing. The example of the ubiquitous coffee-to-go explains why this is relevant: typically efforts in sustainability will focus on ensuring that the coffee is of organic and Fair Trade quality, or similar. The focus is laid perhaps too much on the food product level. Whether the coffee in the cup is organic or Fair Trade and the cup is made of renewable resources does not change the relatively young lifestyle fashion of a coffee-to-go itself. It does nothing to address such a new practice entering mainstream and producing the most tremendous amount of waste. Initiatives addressing the wasteful practice, such as the kill-the-cup campaign, took a few years before they were up and running. For sustainability endeavours to be effective, tackling the context of eating will be critical.

Data definition difficulties and data availability

Decisions are made on the basis of data, not just market policy decisions but also for policies targeting health and nutrition. Data are only as good as their definition (and method). Food eaten in HORECA used to be clearly an “out of home” activity while food bought from a retail outlet used to be prepared and cooked at home. The activities underlying the definitions were straightforward and quite separate. Nowadays, retail-bought food is often

eaten out of home (on the go). This can be illustrated by the following examples. A person has just bought a drink and a baked good to go from a bakery at a train station and eats it at the travel station. This is an out-of-home eating act. However, the place it has been bought from is classified as a bakery, hence it is a retail sale. Also, nowadays restaurant-bought food is delivered to homes to be eaten there. People are meeting up with friends at home, eating together, but the food that they eat comes via a delivery service from a restaurant. How is this defined or classified? The sales part is out of home and the eating part is at home, though the definition may change with the perspective. One feature of this may be that we are missing the shift because of the way the data are measured. Increasingly such data are not only interesting for industrial activity measurements but also to follow food through a value chain (system) for questions important to public health nutrition and other fields.

Does everyone need a kitchen?

The continued course of human movement from rural to urban settings underlines the critical role of cities and of providing food-related services to or within cities. The act of eating is inextricably linked to lifestyle and the architecture of life. When we consider what kind of sustainable food products and meals populations will be consuming, the context of that activity should bear equal scrutiny, especially in view of increasingly small household units (one to two person households) and their resource consumption. One urban laboratory exploring these questions is the Kalkbreite Cooperative in Zurich, Switzerland (<http://anleitung.kalkbreite.net/>). The residential development was designed to meet the 2000-watt energy consumption goal per person. Besides commercial (e.g. office space) and cultural (e.g. cinema) spaces, there are private housing units. With regard to kitchens, the units either have a mini-kitchen or are cluster flats that share a common room and a large, professionally equipped kitchen. This translates to real space and material savings, as not every unit needs every appliance. Kalkbreite has a sizable walk-in freezer (−18 °C) with lockers, releasing household units from the perceived need to possess their own freezer. Lifestyle-related questions that may deserve more attention include: does everyone need a kitchen? a store room of their own? a freezer of their own? does everyone need to cook? what scales are sustainable? It is here that a professional food service has a critical role to play.

Take home messages about the role of sustainable HORECA for sustainable lifestyles

1. Introduce organic and sustainable goals as a change agent; in this way the operational units and the people involved start a transformation journey.
2. Inspire with stories about people (champions) and practice (places). Information is important but the rational consumer model is outdated. These stories can be addressed to all stakeholders. Consumer information can and should happen in food service too, especially in institutional catering (captive audience).
3. Enlist foodservice to co-create a better food system now. Chefs can drive transformation, how can stakeholders contribute to drive transformation?

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The catering sector as a sustainable value chain

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ABSTRACT

In Western countries, catering is one of the main supply channels of food. It also determines eating habits and culture because it provides a facility where people eat several times a week, mostly for their entire lives. Influencing the catering value chain is a great opportunity to influence eating habits and culture towards a more healthy and sustainable diet with, for example, less animal-based products and more plant-based products (i.e. fruits and vegetables). It also is precisely this element of more plant based and less animal based products in our diet (the protein transition) which is a very impactful way of value creation throughout the food chain on the one hand, while on the other it is very hard to influence because of the sensitive nature and the perception that animal based-products are luxurious every day products (a commodity). And for precisely this hard to influence element, catering offers a great opportunity via, among other things, unconscious influencing.

In this paper we present the approach and tool Smaackmakers developed to achieve more sustainable catering and the different chances of the value creation of catering it offers. We outline the focus of the tool ('the roadmap towards more sustainable catering'), on the process of change, the actual changes in the offerings, and the communication. We show that catering and offering need to be approached in a new way, to make the change towards more sustainability in the catering chain. For example, considering the value chain of catering, canteens almost always form the concern of the facility and are almost never a shared concern of also the human resources or sustainability departments. While health and sustainability directly relate to the eating habits of employees, productivity, absenteeism and sustainability goals are all connected to the (offerings in) canteens. Moreover, CO₂ reduction, as well as being a healthier offering, can easily be accomplished by diminishing animal-based products in the offering. Striving to a more sustainable offering and stimulating sustainable choices are a great opportunity for this.

In this paper, we explain how this approach can lead to new standards for catering and how this stimulates a more sustainable chain that brings value to all chain actors – for consumers, companies, caterers, suppliers, producers and, eventually, to a new, more sustainable food culture.

INTRODUCTION

In the light of the FAO workshop on value creation to contribute to a more sustainable food chain, Smaackmakers introduced its approach to bring the necessary protein transition further through the out-of-home food sector, specifically catering and restaurants. In this brief paper we will explain how the catering chain can be of significant added value in this

difficult but necessary transition and a leverage of sustainable consumption and production (SCP), based on our own two-year desk research and field research as well as on five years of experience working on this issue in the catering and restaurant sector in the Netherlands.

This paper is not a scientific peer-reviewed paper, but a way to share our insights and the experience we have gathered around the issue and in the specific sectors. We will outline the approach we developed and with which we are working in the Netherlands at several caterers, hotels and restaurants. First, we will give a short introduction on the protein transition and the urgency to act on this issue. Second, we will give a short description of the importance of the catering sector regarding our food culture and eating habits. We will shortly outline the extent to which the catering sector in the Netherlands is acting on sustainability and specifically the protein transition. Then we will introduce the method developed by Smaackmakers¹ and InnovatieNetwerk² to help the catering and restaurant sector to a more sustainable supply and how to present it to its clients and guests. Last, we will share some examples from our experience in testing the method in practice in the Netherlands. We emphasize the distinction we make between catering and the restaurant sector in our approach. The restaurant sector is a closely related field and a sector that shows similarities in potential for reaching a more sustainable offering. At Smaackmakers we also address this sector with a slightly different approach. In this paper we will mainly focus on the catering sector.

The Western diet and food culture is largely based on animal-based products. Precisely these products are of high impact in terms of CO₂ emissions, biodiversity loss, hunger and malnutrition, low standards of animal welfare, and even health through food-related diseases. These eating habits are strongly anchored in Western food culture and are difficult to change. Change is hard both in terms of consumer behaviour and in terms of business and policy that have led to the food system functioning this way. Adaptation of our diet towards a diet with less animal-sourced products and more plant-based products (i.e. fruits and vegetables), also referred to as the protein transition, is a very impactful way of value creation throughout the food chain. This protein transition is not an isolated subject. It is interconnected with our eating habits and food system as a whole and thus needs to be approached in this bigger picture. That means we need to look at the functioning of sectors that are closely linked to our eating habits, for example, considering the value chain of catering, the offering in canteens, (company) restaurants, kiosks and public spaces defines the consumers' image of what a normal diet consists of. The catering and restaurant sector has an important role in our food culture and eating habits.

In this paper we explain different opportunities of value creation of catering towards more sustainable food chains, and how catering can be a leverage of sustainable consumption, and more specifically of the protein transition. Till now the offering in the restaurant and catering sector is not in line with the interpretation of what a sustainable

¹ Smaackmakers is a fresh start-up that aims to accelerate a more sustainable food system and food pattern, through lobbying, advice, development of tools, workshops and training towards a more sustainable catering and restaurant sector, aimed at governments, municipalities, companies and stakeholders in the out-of-home food market.

² InnovatieNetwerk (in English InnovationNetwork) is a Dutch organization linked to the Ministry of Economic Affairs, aimed at stimulating game-changing innovations in the agro/food industry.

diet is (healthy, more local and seasonal, less food waste, less processed food, high variation and, as an important element, more plant-based and less animal-based products). Changing the offering could be a start of moving towards a more sustainable food culture and eating habits. This paper explains the tool "Roadmap towards more sustainable catering", developed by Smaackmakers with the support of InnovatieNetwerk, after two years of extended research, and which is now being tested in the Netherlands. The Roadmap takes both the process and barriers of the stakeholders in this chain into account, as well as the practical implementation of a more sustainable offer. The protein transition is an important element in this. In line with the sensitivity of the subject with all stakeholders, we do not necessarily emphasize the protein transition as an isolated focus within the Roadmap. Rather, it is intertwined in the whole and appears as a natural and self-evident part of the whole. The fact remains that precisely on this subject, knowledge and expertise are lacking and the most impact can be made. For that reason there will be a relatively large amount of attention to this subject from all stakeholders. With the Roadmap we anticipate that.

Regarding the process of change at which the Roadmap aims, the Roadmap helps to overcome the defined main barriers for companies to invest in more sustainable catering, i.a. the policy for catering within organizations. In the Netherlands, catering almost without exception forms the concern of facility departments and is rarely a shared concern of also human resources – or sustainability – departments. Awareness is lacking of the advantages of more sustainable catering. Higher productivity, less absenteeism and opportunities for sustainability goals are all connected to the (offering in) (company) restaurants. Moreover: CO₂ reduction, as well as a healthier offering, can easily be accomplished by diminishing animal-based products in the offering. With the Roadmap we stimulate to change this policy by making management aware of the fact that health and sustainability directly relate to the eating habits of employees and by showing the advantages of more sustainable catering.

Regarding the practical implementation of sustainability in the supply/offer at which the Roadmap aims, the Roadmap provides tools to raise awareness and to increase knowledge and skills on sustainable diets. For example, sustainability is made tangible and practicable with the "eight sustainable food principles" developed by Smaackmakers, which give direction on to what sustainable choices are. Through workshops (a part of the steps in the Roadmap) inspiration, knowledge and skills are brought to, among others, kitchen staff. Through a restaurant scan, opportunities for change are defined. Through advice and guidance, opportunities can be seized.

Furthermore, the Roadmap offers steps and tools for effective communication aimed at guests and employees to stimulate sustainable choices. Another focus of the Roadmap is raising awareness among the (kitchen) staff, direction, management and employees of different departments and offering inspiration and skills to enable them to contribute to the ongoing change towards a more sustainable offer.

In this paper, we explain how this approach can lead to new standards for catering and how this stimulates a more sustainable chain that brings value to all chain actors – for consumers, companies, caterers, suppliers, producers and, eventually, to a new, more sustainable food culture.

The protein transition

What is the protein transition and why is it necessary? The protein transition is the necessary transition towards a diet that is less based on animal proteins and more on plant-based products (Aiking, 2011). For Western countries, this means reducing the consumption of animal-based proteins and for emerging markets and developing countries this means preventing them from reaching our level of meat and dairy consumption. A big challenge, because meat is considered a luxury product and its consumption, mainly in the latter countries, is growing (Godfray *et al.*, 2010).

Its importance lies in the fact that there are several environmental implications associated with the expansion of livestock production (FAO, 2006), such as water usage (the number one consumer of fresh water), deforestation, greenhouse gas emissions (at least accounting for 18 percent, which is greater than the global transportation sector)³, biodiversity loss as well as dead coasts caused by nitrate leaching. Overall, livestock production is responsible for 70 percent of global agricultural land use, so a majority of the land used today is used specifically for the production of animal-based products (Fiala, 2008). A plant-based diet can feed up to ten times more people, which will reduce our ecological footprint and climate impact (de Bakker and Dagevos, 2012). Furthermore a more plant-based diet is generally healthier (Norat *et al.*, 2005). At the same time, our Western diet is mainly based on animal products. In short, if we want to make it with only this one earth, we have to change something in our daily menu and prevent others from taking over our bad habits.

THE RELATIONSHIP BETWEEN PROTEIN TRANSITION AND CATERING

Our current diet

Our current diet in Western countries is largely based on animal proteins. Take for example the Netherlands, where 70 percent more protein than necessary is used on a daily basis (Voedingscentrum, 2012). Our high consumption of animal-based products has nothing to do with resource efficiency. It has got everything to do with eating habits and food culture.

At least for the Netherlands, and most likely for most of the Western countries, there is no lack of reasons to switch to more plant-based food, given all the advantages of a more plant-based diet. There is a lack of awareness of the need. There is no lack of alternatives on the producers' side, at least in the Netherlands, which is, with years of investing, experience and knowledge, one of the leader countries in sustainable proteins. There is a lack of knowledge about it and the daring to explore it. And thus there is a lack of alternative offerings/supply in the regular channels, such as in catering and restaurants.

Role of catering with respect to our eating habits

That is exactly where catering and protein transition meet. What is offered is seen as what is "normal". And that normal is far from a "sustainable diet", especially concerning the ration of animal- versus plant-based products. As also outlined in Box 1 in the paper, Catering (among others) determines eating habits and food culture (de Bakker and Dagevos, 2012)

³ These figures include the CO₂ produced from the running of equipment and the facilities as well as the CH₄ produced from manure decomposition, which is 20 times as potent as carbon dioxide in greenhouse potential (Baumert *et al.*, 2005).

Box 1

Catering for a great part determines our food culture, diet and eating habits:

- The catering sector is an important customer for manufacturers and suppliers.
- The catering sector serves a huge market (more than 2 million meals per day by the ten large Dutch caterers alone).
- The consumer/guest is dependent on the (supply of the) caterer (captive consumer).
- There are repeated contacts of consumers with the caterer.

because it is a facility where people eat several times a week and, for example in company restaurants, mostly for their entire lives. Furthermore, catering is highly visible. In Western countries catering is one of the main supply channels of food. In the Netherlands, for example, the ten large caterers alone provide more than 2 million meals a day (in a country of only 16 million). Adding the more than 40 000 restaurants, the impact is even greater. Catering is everywhere: at work, in hospitals, in kiosks on the streets and stations, in public facilities such as cinemas, etc. – and last but not least, in schools, where children are taught the standard, the “norm” concerning our daily food.

The current standard, whether it is in schools or company restaurants or at events, is, among others: ham and cheese sandwiches, burgers, chicken nuggets, meat pasty, milk and yoghurt. The anchoring of the consumption of animal proteins in the Dutch food culture, and the difficult to break traditional eating patterns, ensure that a transition towards a more sustainable diet in general and a more plant-based diet specifically cannot be realized by the consumers alone (Backus *et al.*, 2011). Suppliers play an essential role. Changing the supply of catering and restaurants may be a beginning of new eating habits. An offer of more healthy and more plant-based products, fruits and vegetables also changes the “norm” towards a more healthy and plant-based diet. In that way we learn new eating habits through new products and dishes. This knowledge and experience can be taken back home, and included in our daily diet and our social environment. So it becomes a self-encouraging model and slowly changes food culture.

Role of catering with respect to a more sustainable food system (and protein transition)

Catering is not only a leverage of sustainable consumption aimed at the consumer, but also at production in its entire food supply chain; the large caterers are an important customer of major suppliers (such as wholesalers). In the role of that important customer, caterers influence the supply from the main suppliers, with their request to a sustainable, more plant-based and healthy demand (more fruits and vegetables, more alternatives to animal-based products and less animal-based products in general). The suppliers in turn influence the producers. The adjusted offer of producers and suppliers in turn has an effect on other customers such as smaller caterers, restaurants, kiosks and hangouts. To close the loop, this also has its effect on consumers’ perception of the normal and eventually on their expectations and demand.

In that way, influencing the catering value chain is a great opportunity to influence eating habits and culture towards a more healthy and sustainable diet and offering (de Bakker and Dagevos, 2012). Because of the opportunities of unconscious influencing food choices it offers a huge opportunity to work on a complex and sensitive subject as the protein transition. As Smaackmakers we are committed to answering the question ‘How do we ensure that the pivotal role catering can play in changing our diets, food culture and food system, with the protein transition as an important part of it will be recognized?’

A “ROADMAP TOWARDS MORE SUSTAINABLE CATERING”

Sustainable supply

Before we outline the approach we developed, the term “sustainable catering” deserves some attention. What is sustainable catering and how do we get there? There is no consensus as to what is a sustainable diet and thus about what sustainable catering is. Of course, much research is being carried out on what a more sustainable diet looks like. Based on research, we can derive what elements we could influence to get to a diet with less negative impact. To prevent us from getting stuck in the (important) discussion on what a sustainable diet is, we base our approach on existing research and knowledge. First of all, as Smaackmakers, we developed an explanation of “sustainable food” or rather “sustainable offering”. We have developed eight principles, derived from existing research, that together lead to a (more) sustainable offering. These eight principles are: less food waste; labels and fair trade; locally produced; seasonal; health; packaging; innovation; and last but not least, more plant-based and less animal-based. Also see Box 2 in the text. More information on these principles can be found on the Web site and on request. We have taken these principles into account in a “Roadmap towards more sustainable catering”, which we have developed after two years of research. In our approach, we focus on that element that usually gets least attention, is the most prejudiced and deals with a lack of knowledge – the transition towards a more plant-based and less animal-based diet.

Box 2: The Smaackmakers’ Future Proof Food Principles

Smaackmakers’ developed eight sustainable food principles as a tool to guide caterers and restaurants towards more sustainable offerings. These principles are:

1. Plant Power (More plant-based and less animal-Based)
2. Less food waste by prevention and creative solutions
3. Labels (if it is of added value) & Fair
4. Locally produced where possible
5. Seasonal products where possible
6. Healthy due to a balance in the total offer and composite dishes
7. Efficient Packaging where it is of added value (extending expiring dates)
8. Innovation due to new products and ways of presenting

Developing the Roadmap

The Roadmap is based on two years of research in the Netherlands. With our first research we identified the barriers and opportunities for caterers to increase the proportion of plant-based food and thereby reduce the proportion of animal-based food in their offer (Nicolaas G. Pierson Foundation, 2012). The results were based on desk research and interviews with ten of the largest caterers in the Netherlands. This research formed the base for a perspective on the possibilities to remove barriers in order to facilitate the transition to a more sustainable offering and the protein transition. Together with InnovationNetwork, we built further on this first research. We explored the barriers throughout the chain and developed a tool to overcome the barriers and seize opportunities: a “sRoadmap towards more sustainable catering”. The Roadmap is an instruction or guiding tool consisting of ten steps aimed at: the different stakeholders, the change process and the actual change of the offer. The third research and development phase aimed at making the Roadmap more practically applicable. We further completed the steps with the development of workshops, presentations and training that are part of the ten steps. We further explored the chances of the “restaurant scan” as a tool. And we further refined elements of the approach with the Roadmap such as the element of communication with the stakeholders and how to convince them to work with the Roadmap and work on sustainability. One of the barriers to the actual more sustainable offer is the lack of awareness of the several impacting elements. Changes are mainly aimed at more organic or labelled products, more local and seasonal products and sometimes less food waste. The impact of diminishing animal-based products is not yet known as an element of sustainability. Then there is also the lack of inspiration and skills to work with less animal-based and more plant-based products. These barriers would show the need for extra attention to this element in the Roadmap. On the other hand, there is the fact that the protein transition deals with many prejudices and is not yet recognized as a mainstream approach. And thus in the Roadmap we do not overemphasize the protein transition. It is one element of the eight principles we work with and it is an important part of the explanations of the importance of more sustainable diets and catering in the workshops and training sessions.

Working with the Roadmap

The Roadmap is a tool to facilitate the efforts towards more sustainable catering. It consists of ten steps for caterers and for companies (that redeem catering) to get to a more sustainable offering. The steps take into account: (i) the barriers and opportunities for the different stakeholders; (ii) the process of change; and (iii) the actual change of the offer. The focus in these three elements is further outlined below.

Main aims for each stakeholder group and the restaurant

The steps of the Roadmap address the challenges for the main stakeholders in the process (in the chain) and aim at the most important target groups: the catering company; the clients of the catering company (e.g. companies with company restaurants); the employees of the client; the employees of the restaurant/caterer; and the main suppliers. The Roadmap takes into account several relevant factors that need to be addressed to get to the more sustainable

offering: support (from the stakeholders); awareness of the need to change; knowledge and skills (needed to take steps); communication (with staff, employees and guests); and tools and guidance (in the change process). The main goals touch on the process of change as well as the implementation of the practical change. In short, the main goals for the different stakeholders are:

1. (Potential) guests (of the restaurants):
Stimulating the demand for healthier, more sustainable restaurants by seducing, inspiring and enthusing (potential) restaurant visitors, for a more sustainable supply and to enable them to make sustainable choices by facilitating them in knowledge and context.
2. Client (management and human resources department):
Convincing management and the human resources department of the importance and benefits of a sustainable and healthy lunch (among others: because of staff productivity, health and satisfaction and the relationship between lunch and Corporate Social Responsibility) and encouragement to make (a more sustainable) catering a part of the company's sustainability policy. Stimulate to see the caterer as a partner in vitality.
3. Client (facility department):
Increase the knowledge of the facility, human resources and sustainability departments and stimulate catering to be a shared responsibility. Increase knowledge, skills and inspiration of the kitchen staff on opportunities for sustainable offerings (further than at product level).
4. Caterer:
Stimulating the caterer's policy towards product level transcending sustainability. Increase the knowledge of the needed change and awareness of the need for change at the level of management, menu developers and kitchen staff. Stimulate to be present itself as a partner in vitality.
5. Company restaurant/the offer:
Identifying areas for improvement with a restaurant scan and implementation of (gradual) changes towards a more sustainable restaurant, together with the caterer and client. Defining what skills are lacking. Increasing knowledge and skills through workshops.
6. All stakeholders:
Communication: support within the organization at the levels of employees, management of different departments, caterer, kitchen staff and guests through appropriate communication at all stages.

The ten steps work on these defined goals for the six stakeholders. The sequence of the steps and the number of steps to be taken, depend from the situation of the stakeholders and in which phase they are in. The steps can be taken separately, differing on these factors.

Focus on achieving a more sustainable offering

Concerning the actual change of the supply, the Roadmap takes into account all eight principles towards sustainable food, but emphasizes the possibilities of the protein

transition as leverage for a more sustainable supply. However, as mentioned earlier, this emphasis is present in a subtle way. The Roadmap is not a roadmap towards more plant-based catering and it is not presented in this way. It aims at more sustainable catering. It is only in the process of going through the steps that the protein transition will naturally play a great part. This is because this is one of the aspects on which the greatest impact can be made in terms of sustainability (Schösler, de Boer and Boersema, 2012) and because it is an aspect where awareness, knowledge, skills and creativity are missing (Nicolaas G. Pierson Foundation, 2012). Smaackmakers is specialized in this area and in incorporating it into the bigger picture. With the steps in the Roadmap we dispense helpful knowledge and, together with various partnering organizations, share this knowledge in effective ways and teach helpful skills. Inspiration for kitchen staff (including the chef) and menu developers is key. This focus on “more plant-based, less animal-based” makes the Roadmap even more attractive to the growing group of entrepreneurs in the catering sector that want to work on the protein transition, but do not know how to, especially combined with all other aspects. It is our expertise in how to act on the protein transition that makes certain innovators in the catering sector in the Netherlands want to work with our approach.

Focus on the process

Concerning the process, our approach emphasizes that catering should not be the responsibility of only the facility services department but that it should also be incorporated in human resources, sustainability and policy departments. With this focus we respond to the barrier in the chain, that catering is not (yet) seen as a powerful tool to work on sustainability and to improve employees’ performance and satisfaction. In our approach we focus mainly on companies (with a catering facility) because the great advantages for this group work as leverage for more sustainable catering. The Roadmap, therefore, aims for a great deal on convincing companies that investing in more sustainable catering will pay off.

First of all, it can be done by showing companies that redeem catering the potential value that catering actually offers. Catering is now part of facility services. It is seen as a mandatory facility that gets almost no attention; this while catering is actually the fuel of the most important asset of any company: its employees. Employers do invest in a clean office, comfortable chairs, fast computers, air conditioning and more to help employees to function optimally. But they do not yet invest in the well-being and productivity of employees through what they eat. Research shows that a healthier, more sustainable lunch contributes to productivity and a greater involvement. It can help reduce absenteeism and can contribute to productivity and employee satisfaction by the social role that it can play (TNS Nipo, 2012). All components generate indirect but significant profit for the organization.

Second, with the Roadmap we help organizations to recognize that catering should be a part of sustainability policy, for catering often forms a large part of the footprint of the overall business operations. Catering, certainly one with less animal- and more plant-based elements, can make a major contribution to CO₂ reduction and the sustainability goals of the company. In the Netherlands we increasingly promote this new approach, successfully.

The new role of catering in the organization

Distinctive in this approach is that sustainable consumption and production, and especially the protein transition, is not encouraged by directly influencing consumers but by influencing the supply standard about what is offered, in this specific case in one of the main supply chains of food: the catering sector. A new normal is being created for consumers as well as for the producers, caterers and companies that offer catering to their employees. In this way, a diet that is more plant-based, as well as vegetables and plant-based products gets a new image – an image that emphasizes the luxury of such choices, both the “substitutes” as well as vegetables and fruits (dishes). This new image of a more plant-based diet and its products can in turn be a good starting point for efforts to keep developing countries and emerging markets from excessive consumption of animal protein, by showing the advantages and luxury of other protein options.

With the eight principles, sustainability is approached in a new tangible and feasible way and protein transition no longer gets rejected, but instead is seen as a natural part of the bigger picture. Because sustainability in the offer is no longer approached as an effort at product level, there is much more space to work on sustainability in other ways.

With the new approach, catering is seen as a part of policy of also human resources and sustainability departments. The caterer is seen as a partner in vitality. And the advantages of more sustainable catering are acknowledged and acted upon.

The extra attention towards inspiration, skills, awareness and communication ensures that the effort towards more sustainable catering is guaranteed throughout the organisation.

EXAMPLES OF PROJECTS WITH THE ROADMAP

We have been working with the Roadmap for over two years. Among the clients we have worked with are small and big caterers, restaurants, hotels, conference venues, municipalities, ministries and several companies with a catering facility. Because of the extensiveness of the Roadmap and the still-existing restraint when it comes to investing in sustainability, we have not yet implemented the ten steps of the Roadmap with one client. Instead, we have been working with several of the steps, for each client a different set. The most interest of the clients went to “awareness of the need of sustainability among the (kitchen)staff and employees”, “skills on more sustainable behavior among employees”, “inspiration, skills and knowledge for kitchen staff towards more sustainable dishes and menus”, “restaurant scan and advice towards a more sustainable offer”, “guidance towards determining and formulating sustainability ambitions in catering”, and “communication advice”.

Responding to these interests we could use the tools developed from the Roadmap. We will explain the practical implementation of certain steps of the Roadmap with some examples.

Example: increasing awareness and motivation at the employee level

The first example is of three organizations (a province,⁴ a hotel chain and a conference venue) with a similar question and similar challenges. We will use the province as the

⁴ In the Netherlands “province” designs a sub-national level of organizations. The Netherlands is divided into 12 provinces.

leading example. This organization has high ambitions regarding sustainability. Some steps towards more sustainable catering have already been taken. These concentrated mainly around labels, local and seasonal, and food waste. The organization wishes to extend its effort in becoming more sustainable but meets certain challenges in doing so:

- 1) a moderate motivation and commitment of the (kitchen and service) employees;
- 2) lack of knowledge and creativity of the (kitchen) staff to achieve far-reaching sustainability steps;
- 3) lack of (efficient) communication with the guests to guarantee enticing them into more sustainable supply and enthusiasm for (future) changes and sales;
- 4) lack of attractive and sustainable appearance of the “canteen area”;
- 5) no vision of required changes, no plan or goals to work on sustainability.

We started with a meeting with the facility manager and the head of staff. Here we convinced them of the advantages of more sustainable catering and the approach to reach this goal. We agreed on the steps to take, starting with:

1. a meeting with management of several departments to convince them of the importance and to increase involvement in catering in departments other than only the facility department;
2. an introduction session on sustainability and catering for several departments to raise awareness and increase knowledge and awareness;
3. a survey on barriers to behaviour change towards sustainability in catering among kitchen staff and guests;
4. a second session in which the barriers and opportunities to act on sustainability are described and to increase involvement, insight and cooperation;
5. a third session with tools and tips to increase possibility to act and cooperation;
6. defining ambassadors of change throughout the organization and developing an ambassadors’ plan to secure ongoing effort on sustainability steps;
7. a restaurant scan and an advice report for possible changes;
8. a workshop and inspiration session for kitchen staff to share the possibilities for a more sustainable menu and to teach skills;
9. a communication analysis and a communication plan for internal communication and communication with guests;
10. evaluation.

The results of the approach were, for all three organizations: Involvement and motivation at employee level increased; sense of responsibility for sustainable catering and eating habits of employees increased at management and different department levels; self-efficacy at employees and kitchen staff level increased; creativity in forming menus increased; and awareness of the ratio plant- versus animal-based products increased. We are not yet able to measure the actual change at the menu level, but the willingness to take concrete steps was high at the last contact we had.

Example: developing a more sustainable banqueting map and stimulating ordering behaviour

Another example of implementation of several steps is one of the Dutch ministries: The Ministry of Infrastructure and Environment. The ambitions of this ministry for sustainability are high and it wants to act as an example of how sustainability could be internalized and applied. The ministry sees catering as an important part of its sustainability policy. The challenges the Ministry defined are:

1. the current lack of sustainable offers on the banqueting map of the caterer;
2. the fixed contract with the caterer that stagnates sustainability;
3. the lack of awareness of the need for sustainability at employee level;
4. the lack of skills/possibilities at employee level to act more sustainably;
5. the lack of proof of how sustainable certain lunch choices are.

In response to these challenges we developed and carried out the following steps:

1. A meeting with the caterer, the client (the ministry), and the actual client, which is the facility service of all ministries, to raise awareness of the need and possibilities and to define the possibilities within the current contract.
2. Development of a sustainable lunch for the banqueting map for all locations throughout the Netherlands for this ministry, in cooperation with the contract caterer.
3. A bipartite workshop for management assistants (the ones who do most lunch orders) to raise awareness of the need for sustainability and to teach knowledge and skills for more sustainable order behaviour.
4. An interview on the most important barriers for more sustainable order behaviour.
5. Research and a report: a comparison on sustainability of the sustainable lunch and the most ordered lunch, via the eight sustainable food principles.
6. A communication plan to increase the sales of the sustainable lunch and to increase the awareness of the importance of this.

The results are positive and provide perspective for a follow up. The sustainable lunch appears to be more sustainable on seven of the eight principles. The caterer is even more willing to work on sustainability. The management assistants are motivated to order the sustainable lunch and are ambassadors for more efforts on sustainability in the banqueting map and restaurant. The employees evaluate the lunch as “very good and tasteful”, “surprising” and “more representative for the organization they work at”. The discussion is raised at the level of the board on the process of the lunches. A follow up is given on this process. We are asked to extend the sustainability comparison. And we are asked to hold a workshop session for stakeholders throughout the catering chain and other ministries on the success story of the sustainable lunch, commissioned by the ministry of Infrastructure and Environment.

Other examples

Many of the projects we carried out focused on steps to achieve a more sustainable menu. For this we developed a workshop that raises awareness on the need for sustainable food (systems) and eating patterns, on what sustainable food or a sustainable menu

actually is, and on how to get to a more sustainable menu. The workshops combine knowledge with the experience of sustainable food via a tasting and/or cooking session. For examples of clients and nuances in these projects, refer to the Web site. Also for other examples of projects of the implementation of (steps of) the Roadmap, refer to www.smaackmakers.nl/portfolio.

PLANS FOR EXPANSION

At the time of writing this paper, several projects are under way in which we make use of the Roadmap. For projects that we have already run we are evaluating to gather more information on the results. So far the Roadmap seems to work effectively and we are adjusting and extending it to make it fit the challenges that differ per organization and target group. In this way we build on experience and flexibility to make the Roadmap applicable in a wide range of situations. We hope to extend the approach of the Roadmap abroad and are currently looking for partners in other countries who want to work on more sustainable catering as a means for sustainable consumption and production.

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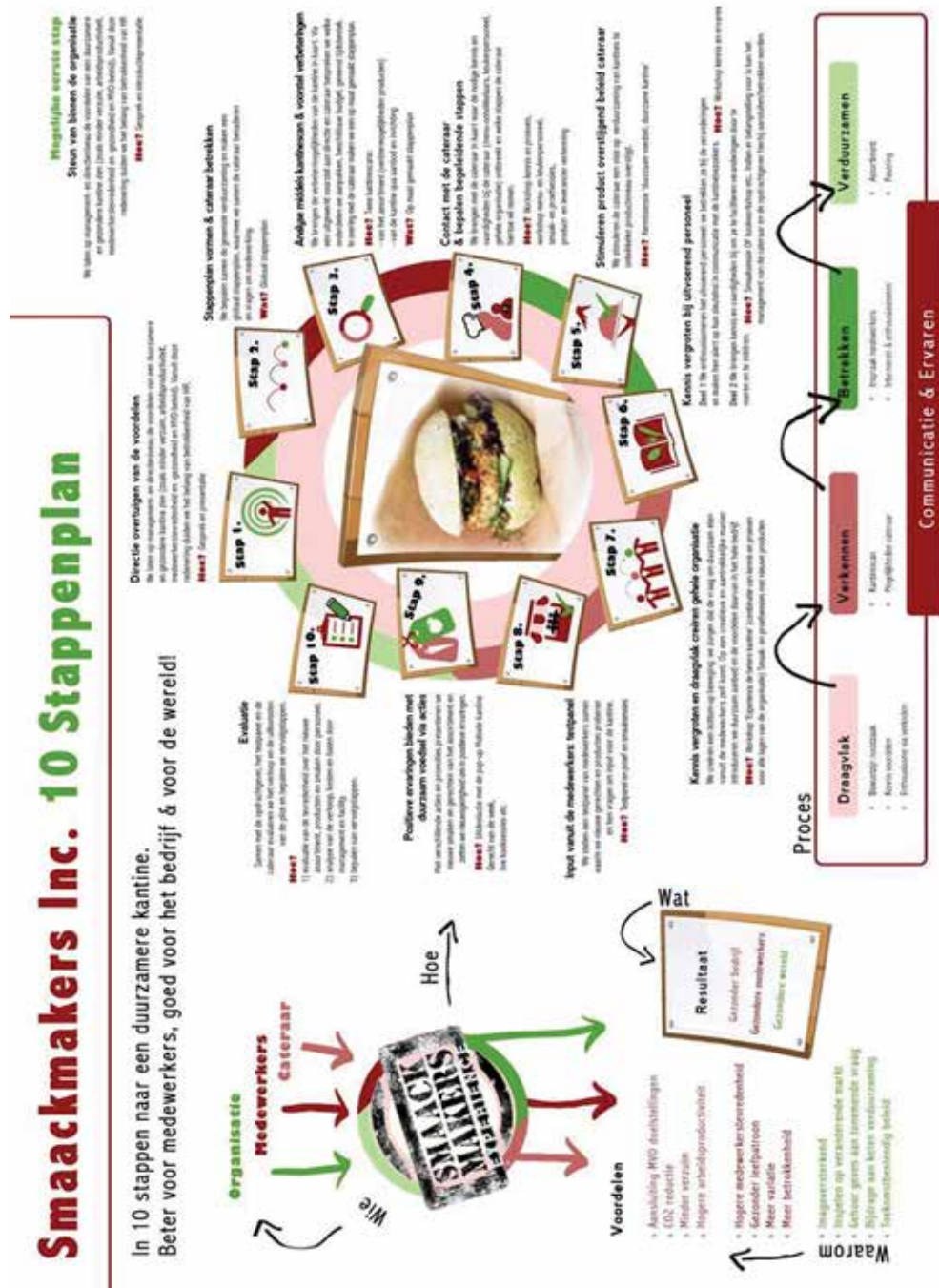
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For more information, further explanation or more examples, contact Smaackmakers through www.smaackmakers.nl or Natascha Kooiman via natascha@smaackmakers.nl.

APPENDIX

Roadmap towards more sustainable catering (not yet translated into English)



Institutional food procurement programmes: key aspects for programming and policy design

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ABSTRACT

Institutional procurement programmes (IPPs) for the procurement of food from local smallholder farmers have a great potential to create, stimulate and support transformative development of food supply systems. They can contribute not only to food security strategies through the distribution of food for people under food and nutrition insecurity, but also for the achievement of other development aims including environmental, social and economic ones. In particular, IPPs for school programmes can be an important instrument to support smallholder production and their integration into formal markets.

Being aware of the potential, but as well of the challenges of IPPs, supporting governments to design and implement local food procurement for school programmes has become an important part of FAO's work. Within this context, this paper aims at presenting findings from FAO experience in the field (i.e. through PAA-Africa) and on normative case studies on IPPs.

INTRODUCTION

Inefficiencies in the food system and limitations in market access for smallholder farmers are important aspects hindering food security in developing countries. Public sector institutions buying food such as schools, hospitals, food reserve authorities, prisons, the military and humanitarian programmes can create effective demand for nationally produced food and, as such, potentially constitute important markets for smallholder farmers.

Usually these buyers do not have a profit motivation and are usually driven by the need to acquire food products for consumption within their own institutions or as part of food assistance programmes. Despite this, they need to ensure high quality standards but minimize costs due to the fiscal onus on the public sector. They are generally guided by public procurement policies that can leave little room for flexibility in contract negotiation or choosing suppliers, tying them to specific safety and quality standards, regulated payment and logistics mechanisms. In general, the limited flexibility leads to difficulties for smallholder farmers' participation in favour of more prepared sellers, also usually counting with economies of scale

However, fostering smallholder engagement with large public buyers may increase access to close-to-home and familiar market outlets with less demanding requirements compared with more stringent export markets. This type of approach could also promote the formalization of markets – a crucial component for transforming agriculture into a legitimate and competitive sector for poverty reduction and economic growth.

PAA Africa is an innovative initiative that combines school meals programmes with institutional purchases from smallholder farmers and agricultural support. It is jointly supported by WFP, FAO, the Brazilian Government and the United Kingdom's Department for International Development (DFID). PAA Africa aims to contribute to food security and nutrition security and income generation for smallholder farmers and vulnerable communities by supporting and promoting adapted local food purchase initiatives in the African continent.

The programme was inspired by the Brazilian experience on local food purchase from family farming producers – i.e. the Food Procurement Programme (PAA – *Programa de Aquisição de Alimentos*) and is currently being implemented in five countries: Ethiopia, Malawi, the Niger, Senegal and Mozambique.

Source: Adapted from FAO/WFP (2014a).

Public food purchase from smallholders is also a good example of how market-oriented strategies can improve food and nutrition security for vulnerable communities while fostering economic development and small farmers' market participation. Recognizing the importance of this approach, the Comprehensive Africa Agriculture Development Programme (CAADP) recognized school feeding based on nationally procured food as regional and national priorities.

As such, institutional procurement at scale has considerable potential to stimulate the domestic transformation and formalization of food supply systems while contributing to local food security and nutrition. Despite its potential, local food procurement as part of food systems development has been inadequately addressed from a knowledge point of view, missing a more comprehensive research agenda. The benefits of linking public food procurement to local farmers are multifaceted as it has the potential for governments to simultaneously address priority development, economic, nutrition and food security goals. Recognizing these benefits, FAO is supporting governments to design and implement food procurement programmes from family farmers for public institutions.

One example is the implementation of the Purchase from Africans for Africa Programme (PAA Africa) launched in 2012. In this programme, FAO supports linking local food production to food assistance and school meals programmes by working closely with the World Food Programme (WFP), local communities, schools and smallholder groups.

FAO has also collaborated regularly with the Purchase for Progress Programme (P4P) implemented by WFP, using its technical areas of expertise to support linking smallholders to markets, addressing food losses, access to finance, promoting sustainable production technologies, and improving food safety and standards.

Learning from these field programmes as well as from studies on the P4P and Brazil's Public Food Procurement Programme and National School Feeding Programme has revealed a number of findings and policy recommendations.¹ This paper addresses some of those.

¹ The series of case studies cover Ghana, El Salvador, Ethiopia, Guatemala, Kenya, Rwanda and the United Republic of Tanzania. The series also includes a case study on the Brazilian experience and its two IPPs: PAA (Food Procurement Programme) and PNAE (National School Meals Programme). They are available at <http://www.fao.org/ag/ags/ivc/institutional-procurement/en/>

POLICY FRAMEWORK: FOSTERING INTRA-MINISTERIAL COLLABORATION

The goals of public food procurement programmes vary from country to country and programme to programme. However, common to all is their multifaceted nature in trying to address a number of development and economic goals, from child nutrition to linking smallholders to local formal markets and poverty reduction.

As such, the multifaceted nature of institutional procurement programmes (IPPs) requires an equally multifaceted policy and institutional enabling environment. This in turn calls for a coordinated and collaborative multisectoral coordination approach. The overall analyses show that the level of success for IPPs achieving their objectives is highly dependent on clear institutional roles and their capacity to coordinate with one another – from ministerial level down to the local level where food is procured and delivered (FAO, 2014a; see FAO, 2014b).

A coordinated and multisectoral approach has been attributed also, for instance, as one of the main factors for the successful implementation of Brazilian PAA, which served as inspiration for PAA Africa. (FAO/WFP, 2014b).

ALIGNING POLICY, LEGISLATION AND INSTITUTIONAL PROCESSES

Political will and policy reform are key to the transformation of local food systems and IPP implementation. However, policy reform and political will are not enough if the institution and legal frameworks are left unchanged. The most salient lesson emerging from the PAA Africa research agenda and field experience has been the critical role that policy and institutional reforms need to play together and interlinked with operational choices or issues in order to lay out the foundation for sustainable and inclusive public food procurement. Equally important is the need for legislative reforms to accompany the development of these programmes.

CUSTOMIZING DECENTRALIZED PUBLIC FOOD PROCUREMENT

Generally, decentralized procurement systems are considered more effective for reducing waste, avoiding large-scale fraud, improving responses to end-users needs, while also encouraging growth of the market economy to rural areas and towns (OECD, 2012; Thai, 2008). A decentralized system means that there are more opportunities for local-to-local linkages that suit local small farmers and enterprises supplying food and end-users such as schools, with spill-over effects for the rest of the local community (OECD, 2000; Thai, 2008). As the information interface is more immediate, delays can be avoided, and costs of transportation and storage reduced. Furthermore, a decentralized system facilitates the supply of fresh food, may increase the quality and variety of food, and could be compatible with local eating habits and tastes (Belik and Chaim, 2009; Villa Real and Schneider, 2011). Nevertheless, decentralization may also mean a decrease in the potential advantages of bulk buying and economies of scale and will necessarily require a decentralized administrative capacity as well as a well-functioning accountability system and in communication with a more centralized administration level. More centralized processes can ensure greater standardization of procedures, facilitating monitoring and control.

Decentralization can occur at different administrative levels (i.e. provincial, district or at institution level). In some cases it may be necessary to have a combination of decentralized and centralized systems, for instance when the required food is not available locally, if the food needs to be fortified in bulk, or if local institutions do not have the capacity to procure food cost-effectively (OECD, 2000; Belik and Chaim, 2009; Swensson and Klug, forthcoming). It is very important that the procurement system is adapted to the country context and that different factors are taken into consideration in its design. These include the country's size – including the level of economic and market structure – the government administrative structure, the volume and type of food required, beneficiaries' needs, and institutional procurement capacities (OECD, 2000).

Pilot initiatives, such as the ones implemented through PAA Africa, provide a great opportunity for testing and choosing the best procurement systems adapted to the country context.

ALIGNING LEGISLATION: THE LAW ON PUBLIC PROCUREMENT

Without the development and/or adaptation of different laws which not only allow but also facilitate the integration of smallholders into institutional markets, it is very likely that an IPP would not succeed in its objectives of supporting smallholder production and access to markets and, in particular, of acting as a driver of development. One of the key legal issues linked to IPPs is the regulation of public procurement.

The main issue of the regulation of public procurement for IPP is that most often public procurement legislation imposes a procurement process (bidding process) that, due to its complexity and high level of requirements, may hinder the participation in institutional markets of a section of population – the smallholder producers – who cannot easily compete with larger producers and traders at these same conditions (see FAO, 2014a; 2014b; 2014c; 2014d).

As can be observed from the IPP experiences, the traditional procurement procedures imposed by public procurement legislation are unsuitable for the characteristics and capacities of smallholder supply and therefore may hinder the development of specific policies and initiatives that aim to support smallholder farmers' access to markets. This stands especially when a complex bidding procedure is combined with a centralized procurement system (FAO, 2013a).

For the implementation of an institutional procurement programme that has the aim of facilitating the access of smallholder farmers to institutional markets, it is recommended to adapt the legal framework – and in particular the legislation on public procurement – to those programme objectives. It is also necessary to develop procurement mechanisms more adapted to the capacities and characteristics of smallholder supply. Nonetheless, the adaptations or reforms should continue building and relying on the basic principles of the public administration, ensuring that accountability mechanisms and transparency are envisaged, regulated and requested for the differentiated procurement mechanisms.

DEVELOPING PROCUREMENT MECHANISMS THAT RESPOND TO SMALLHOLDERS' CAPACITY

New procurement mechanisms need to be designed according to the characteristics of smallholder suppliers, while still maintaining the core principles that protect the interests of the institutional buyer and public sector funds, which will also require some improved capacity from smallholder farmers.

The new procurement mechanisms may take different forms and use different types of contractual modalities (such as direct contracts, soft tenders, forward contracts, etc.), and there is no single model to be adopted. Procurement innovations may be also required with, for instance, tools for improvements in: forecasting demand and funding needs so that food orders are regular and predictable for smallholder production planning; flexible payment mechanisms that include, for example, cash on delivery and advance financing; and logistics systems that facilitate smallholder bulk marketing, etc.

The targeted and adapted demand does not exclude the economic entrepreneurship nature of smallholder farming, it still requires access to productive assets and services (i.e. financial, advisory services, agricultural inputs) in order to better interact with the market opportunities. Farmer organizations (FOs) are important vehicles in strengthening smallholder market capacities. Local food procurement can build on farmers' organizations and also incorporate and foster existing trading mechanisms, such as traders or primary processors. These smallholder market linkage models are also key to support, particularly in the absence of functioning farmer organizations, or in parallel while their capacity is being strengthened.

DEVELOPING A PROPER LEGAL FRAMEWORK TO REGULATE THE ORGANIZATIONAL STRUCTURE OF FARMER'S ORGANIZATIONS

The FO is the main entry point adopted and supported by both Brazilian and P4P experiences for linking smallholder producers to institutional markets. The importance of this model is not only because of the economy of scale that it brings, but also due to its capacity of helping producers to upgrade access to other markets and achieve higher outcomes (among many, Markelova *et al.*, 2009; Shiferaw and Muricho, 2011; Fernandez-Stark, Bamber and Gereffi, 2012; FAO, 2013b).

Nevertheless, despite its importance, market access through FOs also poses several challenges, which include the national regulation of farmers' economic organization. An inadequate regulation may pose significant challenges. It may limit the organization's economic utility and restrict its collective market action function. It can also hinder the organization's economic performance and become an obstacle for long-term development (González, Johnson and Lundy, 2002; Swensson, 2016).

This can be observed in several contexts and especially in the Brazilian experience where the regulation of cooperatives sometimes poses challenges to the smallest producers. On the other hand, the legal form of the non-profit association, although being the most chosen alternative, cannot be considered as the most appropriate instrument for economic entrepreneurship. It is most often incapable of being adapted to all functions and activities that FOs are expected to perform within their aim of market access.

It is important and advisable to ensure the alignment of regulations on farmers' organizations and the IPP's objectives. This can be done not only by improving and updating the related legislation, but also by developing new ones, based on organizational and also contractual arrangements.

MEASURING IMPACT AND MONITORING IPPS

Attention is needed on measuring impact of results and monitoring implementation in order to support efficiency and effectiveness and to promote social accountability. In several contexts of IPP's policy implementation, monitoring systems and transparency remain a challenge to be overcome. Resources are not always devoted to this important aspect and as a result, information and clarity on the implementation performance is not always available on a timely manner for managers and for the society in general.

The Brazilian programme PAA constitutes a good example of how monitoring systems and evaluations should be developed and implemented following the programme complexity and scale-up. The PAA came through several changes of its monitoring system and procedures throughout the 13 years of implementation, more recently incorporating technologies that make available for public managers reliable and timely information organized in a national database linked to delivery and payment information systems. The consolidated data on the PAA programme implementation is available for the general public through an open system for general consultation in the Internet, allowing several search options: from more aggregated information to disaggregated information per farmer, products delivered and payments received.

Several qualitative and process evaluations of PAA were implemented and constituted important sources of information for programming and policy decisions across the years in Brazil. However, the programme lacks an impact evaluation capable to demonstrate and attribute to the programme some of the observed changes on its beneficiaries and local food systems.

Comprehensive and experimental impact evaluations of institutional procurement programmes, especially considering impacts on transformation and formalization of food systems, rural development, food security and poverty reduction, have not yet been properly addressed globally. A recent global effort to push the IPP agenda in the context of humanitarian food purchases led to the implementation of a global pilot programme (Purchase for Progress) implemented by WFP in several countries. The implementation effort was topped with a learning and evaluation agenda that advanced on the production of evidence of impacts by using a quasi-experimental analysis; however, several important questions remain open.

Demonstrating, with quantitative and qualitative analysis, the impacts of linking public demand for food to local food systems and smallholder farmers can provide the much needed evidence for policy-makers to allocate more resources to these kinds of initiatives.

CONCLUDING REMARKS

Institutional food procurement programmes have a great potential to create, stimulate and support transformative development of food supply systems. Nevertheless, the development

and implementation of this kind of programme is not a simple or straightforward task. It requires a series of conditions that must be coordinated and matched together. Those conditions depend – but go far beyond – the governmental will and availability of demand; they are linked to policy, institutions, legal frameworks and operational choices and issues, as well as agricultural enabling environments on the supply side and market enabling environments on the demand side. The findings outlined above address some of those issues and provides some guidance on the topic. Nevertheless, further tailored research for guiding policy formulation and scaling-up, as well as to guide policy-makers through the operational options and related challenges and opportunities of IPPs. is still needed.

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Preliminary assessment of a methodology for determining food waste in primary school canteens

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ABSTRACT

Reducing food losses and waste is increasingly seen as a main way to improve sustainability of food systems, both in itself and as a way to question and improve the efficiency of resource use. Numerous studies have stressed the need to improve data collection and analysis of main causes of food losses and waste particularly in the last parts of the food chain. The project REDUCE, financed by the Italian Ministry of Environment and Protection of Land and Sea, aims to improve data collection on waste in the last stages of food chains and to identify innovative solutions to reduce it. This paper presents the first results of a study developed as part of this project. The objective of this study is to devise an innovative methodology to assess food waste in school canteens that is at the same time accurate, easy to transpose, does not require external support, provides all the useful data on quantity and nutritional quality of food waste (to enable comparison of food intake in children with dietary recommendations such as the Dietary Guidelines for Italians) and involves all concerned actors: kitchen employees and teachers, as well as the pupils themselves, so that monitoring becomes an instrument of active learning.

INTRODUCTION

Reducing food losses and waste is increasingly seen as a main way to improve sustainability of food systems, both in itself and as a way to question and improve the efficiency of resource use and more broadly to raise awareness on sustainability issues in food systems (HLPE, 2014). In September 2015, the United Nations General Assembly approved the Sustainable Development Goals to be achieved by 2030 (UN, 2015). The 12th goal on sustainable consumption and production includes a target for reducing food losses and waste. Numerous studies (Monier *et al.*, 2010; HLPE, 2014; Östergren *et al.*, 2014) have stressed the need to improve data collection and analysis of main causes of food losses and waste particularly in the last parts of the food chain. Gathering data can also be a very efficient way to raise awareness on food losses and waste, its importance and potential means to reduce them.

Intervention to reduce food waste (FW) in the public collective sector is of particular interest for numerous reasons. First of all, because of the huge number of people involved and the volumes of food managed, which could represent a significant source of food waste generation in the supply chain. Second, because the potential for intervention is augmented since eating out of home has considerably increased in the last decennia gaining a relevant role in the daily diet (Ferreira, Martins and Rocha, 2013). Finally, because the public sector can be easily influenced by policies and also contribute to orient private catering. The school canteen is thus an area of major interest to prevent and reduce food waste. It is, however, only being studied in that perspective. In previous studies, FW in school canteens has been analysed mainly with the objectives to improve economic efficiency, to assess the quality of the service provided and menu acceptance, and to evaluate pupils' dietary intake (Getlinger *et al.*, 1996; Engstrom and Carlsson-Kanyama, 2004; Dinis, Martins and Rocha, 2013; Campos, Viana and Rocha, 2011; Cohen *et al.*, 2013).

There is a need for studies in this sector to address the lack of data concerning FW in school canteens in light of the importance stressed at international level to collect reliable data on food losses and waste particularly in the last parts of the food chain. Moreover, the school canteen is also increasingly seen as a relevant place to conduct action against food losses and waste since it gives the opportunity to involve the incoming generations by sensitizing them on more sustainable food consumption habits. Raising pupils' awareness can play a significant role in changing food consumption habits, even at home: through the transfer of learning, the behaviour acquired by pupils in the school context can be transferred to other members of the family and the household in general, where the most important amount of food waste is concentrated in the industrialized countries (Monier *et al.*, 2010; FAO, 2011).

REDUCE (Research, Education, Communication) is a national project supported by the Italian Ministry of Environment (REDUCE, 2016) that aims to collect data on FW in the last stages of the food chain and to provide innovative solutions to prevent and reduce it. It builds upon the progresses realized these last years including through the approval of the National Waste Prevention Programme (MATTM, 2013), the implementation of the National Food Waste Prevention Plan (Segrè, Azzurro and Giordano, 2014) and the Bologna Charter against food waste (MATTM, 2014). The project faces the issue of FW with an integrated approach, through three main intervention strategies: (a) research activities to prevent and reduce FW at the last stages of the food supply chain; (b) technical support and advice for decision-makers; and (c) awareness raising and education oriented to prevention and reduction of FW.

One of the main research activities of the REDUCE project is focused on FW in school canteens. In that field, the objectives are to:

- (a) develop a methodology to collect data about FW, pupils' food preferences and dietary intake;
- (b) collect quantitative and qualitative data about FW and potential causes; the field observation is implemented and coordinated by the University of Bologna with the support of the University of Udine and the University of La Tuscia and conducted in a sample of around 100 school canteens, located in three Italian regions: Emilia-Romagna, Friuli Venezia-Giulia, Lazio;

- (c) identify and formalize means to reduce FW;
- (d) prepare an educational toolkit to raise pupils' awareness on FW.

This paper presents the first results of a study developed as part of the REDUCE project. After recalling the scope of the study, the paper considers the way the methodology has been designed, before discussing the appropriateness of the methodology.

SCOPE OF THE STUDY

The objective of this study is to devise an innovative methodology that is at the same time accurate, easy to transpose and provides all the useful data on the amount of FW and potential causes for reduction, and on pupils' food consumption, in order to enable comparisons with dietary recommendations, such as the dietary guidelines for Italians (SINU, 2014). Finally, it needs to be usable at various scales (local, regional or national level) by the institutions involved in the school service. To that effect, and to limit costs, it should not require external support and rely as much as possible on the concerned actors of the food service.

The study is focused on primary schools, even if the methodology can later be adapted and used in secondary schools. There are various reasons for this choice: it is the first mandatory school for Italians and, differently from kindergarten, children at this age are already able to be involved in pedagogical activities; also, their food habits can be more easily influenced at this stage than at an older age (Iapello *et al.*, 2011). Moreover, primary schools are those with the main number of pupils eating at school, which enables the broadest scope and biggest impact. Another reason is that, as in primary schools the menu is generally unique (apart from special diets related to nutritional, cultural and religious issues), a global analysis of food losses and waste enables deduction of reliable results on food consumption, which is particularly important to monitor pupils' dietary intake. Finally, as in Italy the municipality has responsibility both for the waste management and the management of the food service in primary schools, it has a special interest in reducing FW.

The study aims to assess the waste of food provided by the catering service in the school canteen. Therefore, it includes the prepared food sent to school, its distribution in the refectory and its consumption, whereas the FW generated during storage and preparation is excluded. Since the study aims to assess the system as a whole, the FW generated by teachers' and janitors' meals is included in the data collection. Finally, the study focuses only on food served at lunch, as it represents the main part of food consumed by children at school. Otherwise, including mid-morning snacks would require a specific methodology and additional resources because of the huge heterogeneity in the ways these are provided in the Italian school system. Indeed, in some cases they are part of the school catering service, whereas in others they are directly provided by parents.

DESIGN OF THE METHODOLOGY

The design of the methodology relied on the identification of objectives and of specific constraints and on a review of methodologies used in previous studies in school canteens, including assessment of their appropriateness to the identified objectives and constraints. In addition, four moderated focus groups were organized, two with teachers and two with kitchen employees, to discuss the methodology.

The objectives of the methodology are to collect raw data on FW in such a way that the collected data can be used by the institutions responsible for school canteens to assess FLW at various scales, identify potential causes of FW, assess food consumption, including its nutritional content, aggregated at regional and national levels and compare these with national data of other European countries as called upon by the FUSIONS project (Östergren *et al.*, 2014). To facilitate its implementation on a large scale, the methodology should be designed in such a way to reduce the need for external support and extra costs that could limit its use. In particular, it should avoid external intervention for data collection such as, for instance, ex-post hand waste sorting, as has been the case in other studies (WRAP, 2011). Finally, the objective was also to rely as much as possible on the actors of the food service, in order to facilitate awareness-raising of all concerned actors, especially children. In our methodology, kitchen employees and teachers, as well as the pupils, are thus directly involved in the quantification process, so that monitoring becomes an instrument of active learning (Dewey, 1961), in line with the objective of meals as an educational moment as highlighted by the Italian guidelines for food service in school canteens (Ministero della Salute, 2010). The idea of involving pupils in the quantification phases of school waste partially comes from the Waste Wise Schools Program promoted by the Department of Environment and Conservation of Government of Western Australia (Ralph, 2015).

Previous studies analysing plate waste have used various methods that can be distinguished along three pairs of broad criteria: visual assessment versus weighting, individual versus aggregate/collective, distinction by food types or not. The selection of the method for a particular study is determined by its objectives, constraints and available resources. Visual assessment of plate waste requires, to be accurate, comparing it with the original serving, and has to be done by experienced assessors. Some studies have also noted that it can be quite disruptive to the food service. Weighting is generally more accurate and more easily implemented. Individual plate waste assessment requires individually weighting the waste of each plate, and comparing it with initial servings. This requires traceability of plates and important human resources to be available during lunchtime. It is generally performed on only a sample of plates. As noted by Comstock *et al.* (1979), this procedure is not necessarily accurate, especially when there is a lot of trading among students and a wide variation in serving size. Collective/aggregate methods, for instance weighting of the whole waste at the end of the meal, are easier to implement and enable coverage of larger samples.

The distinction by food types refers to the level of data aggregation. Wasted food can be analysed as a single food, a single dish type or totally aggregated without distinguishing the different food wasted. Considering the objectives in terms of data collection, the methodology needs to enable a distinction by food type. All these considerations pointed to separating waste by food items and accumulating from several people before weighing, which is called “aggregate selective plate waste” (Comstock *et al.*, 1979).

The moderated focus groups enabled precision in the types of inedible parts generally found. They also enabled identification of the final destination of non-served bread and fruit. In some cases, these are left in the refectory; in other cases, as they are untouched portions, they are brought into the classroom by the teachers to be eaten by the pupils during the afternoon.

A pre-test, analysed here, was conducted during two periods of a week in a primary school of the Bologna province. The school has an internal, privately managed kitchen and caters for 167 pupils. It was selected for its interest in the project as well as its proximity and close links to the University of Bologna, which facilitated gradual adjustments to the methodology and informal feedback on its implementation. The quantification was performed by weighing with a precision scale and the analyses conducted at collective level, distinguishing food only by dish type.

DATA COLLECTION

The food is monitored in three stages: (i) prepared food; (ii) non-served food; and (iii) non-consumed food (plate waste). The prepared food is the food that has been prepared for a determined meal and is ready to be served. It is generally larger than what is expected to be served in order to allow unexpected changes and events such as number of people eating or accidents during the final preparation or transport. Non-served food refers to the food that has been prepared and that is not distributed to the final users. Served food is the food given to final users either directly, on the plate (first course, second course, side dish) or put on the table, which can be the case in some schools for bread and fruit. Served food is either consumed or not consumed. The third stage is non-consumed food, which includes the plate waste of all served dish types partially eaten, and bread and fruit that have been put on the table but not touched by users.

Along these stages, food is monitored according to a classification of dish types that reflects the typical structure of the Italian meal: a first course, generally composed of pasta or rice; and a second course, consisting mainly of animal products, with a side dish of vegetables, bread and fruit. This type of classification has already been used in previous studies on food waste in Italy (Iapello *et al.*, 2011; Vezzosi *et al.*, 2014; Falasconi *et al.*, 2015). Each dish type is quantified separately, at each stage, prepared, non-served, non-consumed. This data collection method is easier to implement by the various categories of users. It will, however, require further elaboration to translate the data collected by dish type into food categories in order to facilitate international comparison, in line with the European FUSIONS project (Östergren *et al.*, 2014). To do so, researchers will use an average recipe for each dish, provided by various chefs of the catering enterprises in order to extract data by food categories.

Östergren *et al.* (2014) and WRAP (2011) distinguish food waste as “avoidable”, “possibly avoidable” and “unavoidable” by reference to the edibility of the concerned food: avoidable waste refers to any food waste item typically intended for consumption, while unavoidable refers to all waste from food that one would not expect people to eat; possibly avoidable is defined as items that are eaten by some people but not by others for reasons of personal taste, and to waste items that are the result of a particular method of preparation. After focus groups conducted with teachers and kitchen employees, the inedible and possibly edible parts of the food generally served in Italian canteens were identified. The inedible parts are chicken bones, fruit cores and pits and inedible fruit skins, while the possibly inedible parts are bread crusts and edible fruit skins (e.g. apple, pear). The possibly avoidable food parts have been considered as avoidable food waste since bread crusts and edible fruit peels are generally eaten in Italian school canteens. In fact, bread crusts are

always eaten in Italy and, in primary schools, children do not peel fruit and most of the time teachers do not have the time to do so for the pupils.

As explained above, one of the driving principles in designing this methodology was to limit external interventions for the quantification phase to facilitate its implementation on a large scale and to empower all concerned actors. The kitchen employees perform the quantification of prepared food. They weigh the cooked dishes (first course, second course and side dish), count the portions of bread and fruit and report the data on the kitchen register (KR).

After lunch, the pupils, supervised by teachers, separate their plate waste in five bins, each corresponding to one dish type, identified by a label and pictogram. After the separation phase, the non-served portions of bread and fruit are counted by the pupils of each class and reported in the refectory register (RR) by the teacher before leaving the refectory. In order to record the final destination of non-served bread and fruit, the register distinguishes between portions left in the refectory and portions brought into the classroom, generally to be eaten by the pupils during the afternoon.

The quantification (weighting) of the remaining non-served food, for each dish type (first course, second course and side dish) and of the plate waste collected in each of the five bins is performed by one single class per day, in order to do so in a less crowded environment and to limit the risk of errors. The weighting is performed by pupils under the supervision of teachers who then report the data in the RR.

The inedible parts are not separated from the rest of the food. Their weight is estimated by applying a standardized weight of the inedible parts by portion and multiplied by the number of portions served. It is then subtracted from the overall weight of the waste collected.

RESULTS AND DISCUSSION

The objective of the test was to assess the feasibility of the methodology and the capacity of the various actors to fulfil their role adequately and to identify points that could require additional attention.

Overall, the methodology seems to be well adapted to a study in primary schools. The successive quantification phases have been easily integrated in the normal canteen operations and have not created disruptions in the food service. The various actors were interested in the experiment, willing to participate and have performed well.

Kitchen employees have executed their tasks well. Pupils of eight years and above have adequately separated plate waste in the garbage cans, whereas younger children need to be supervised by an adult to avoid errors. The weighting phase by the pupils has also been performed well, but needs to be adequately supervised by an adult to avoid risks of spilling. Moreover, the test has shown that a methodology involving teachers can be implemented, even if they had to manage additional tasks during and after meals with their other duties.

The test has also enabled the identification of some critical points that call for additional attention. Kitchen employees do not always distribute a number of bread or fruit portions corresponding to the number of users (they sometimes tend to anticipate a lower consumption of these items): this can cause errors of interpretation of data. Some foods, such as rice used for risotto, can stick to the plate, which can result in underestimation of

its non-consumed part. Another relevant aspect that emerged during the test is the risk of a substitute teacher arriving during the monitoring week who needs to be trained.

Finally, some of the constraints in the organization of meals depend on local specificities. The methodology needs to be flexible enough to accommodate these aspects while providing comparable results. These characteristics and specificities need also to be registered as some of them may have an impact on waste. An example that emerged during the test is the small size of the refectory, which imposes the organization of several shifts and thus reduces the length of the meal.

The test also showed how crucial are the training and engagement of teachers. These could be supported by the preparation of specific training tools, which could include a descriptive video, and by a better recognition of the activity and of the additional tasks that it requires. Diverse ways could be explored, such as the designation of a focal point, responsible for coordination in the school. The possibility of involving a volunteer from civil protection in each school is also being considered. At a later stage, sharing of experiences and good practices within communities or a web-based network could be useful to facilitate progress and strengthen the robustness of data gathering.

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Learning from the organic food system as a model for sustainable food systems – the Organic Food System Program

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ABSTRACT

Today's understanding of food systems includes product-specific values (e.g. palatability, taste, nutritional and safety values, health promotion) and process-oriented values (e.g. environmental impact, animal welfare and social fairness). These values are currently challenged and changing. Food habits, cultural, social, ethical, economic and political criteria play an increasingly important role as values. An organic values-based supply chain links food production to values such as partnership, cooperation and trust. Within a values-based supply chain, all actors should be connected through a shared vision. Visions, indicators and parameters have been developed for the organic food system (OFS). In order to identify and leverage values within the OFS, it has to be critically analysed and documented. This makes the OFS a “living laboratory” for sustainable food systems, linking organic production and consumption within one system, thus creating and distributing value along the chains for sustainable food systems.

BACKGROUND

Dietary patterns are becoming more Westernized worldwide (Kearny, 2010). This has tremendous impact on food consumption, the environment, society and individual human health (Tilman and Clark, 2014; Springmann *et al.*, 2016). The consumer can play a pivotal role in participating and influencing this development (Guyomard *et al.*, 2012; Kearny, 2010). The socio-cultural context of food consumption and dietary patterns,

in particular, has been recognized as an essential part of a sustainable food system. A sustainable food system comprises agriculture, environment and human health, but must also include eating patterns (Guyomard *et al.*, 2012; Kearny 2010). Indeed, it has been suggested that dietary habits or patterns should be assessed in at least two different dimensions: impacts on health (nutrition) and impact on the environment (Auestadt and Fulgoni, 2015; Macdiarmid *et al.*, 2012; Wahlqvist, 2014). Therefore, in order to develop, define and evaluate healthy and sustainable diets, a holistic approach is needed (iPES Food, 2015). This gives the diet a crucial role in solving both global environmental and public health problems (Tilman and Clark, 2014). Recently, dietary guidelines have been transformed from a nutrient-based approach towards a more holistic approach linking both food products and food production processes (Burlingame and Dernini, 2011; Mithril *et al.*, 2012, 2013). The central questions can be described as: how can we transform the whole food system to be more sustainable by a combination of sustainable consumption and sustainable production, urgent needs that are currently being taken up by the FAO/UNEP Sustainable Food System Programme (<http://www.fao.org/fileadmin/templates/ags/docs/SFCP/SustainableFoodSystemsProgramme.pdf>). The Organic Food System Program (OFSP), described here, will actively contribute to answer these questions by using the organic food system as a model or “living laboratory”. This is connected to the International Federation of Organic Agriculture Movements (IFOAM) Organic 3.0 (<https://shop.ifoam.bio/en/organic-30-truly-sustainable-farming-consumption>) activities, which contribute to further transformation of the organic food system itself.

THE ORGANIC FOOD SYSTEM

Visions, indicators and parameters have been developed for the organic agriculture and food production system and are further defined by international standards and regulations. Organic agriculture has been practised for 100 years and takes into consideration the natural environment, animal welfare and food quality as well as public health issues (Reaganold and Wachter, 2016). Organic agriculture has spread to nearly all regions in the world (Willer and Lernoud, 2015). Today it is described in the Codex Alimentarius and its vision is reflected in international standards (e.g. IFOAM – Organics International, <https://www.ifoam.bio/>) and defined at the regulatory level e.g., in Europe, the US, Japan and numerous other countries (Willer and Lernoud, 2015). In Europe, the organic label is recognized by European consumers and associated with an eco-friendly and health-promoting food system (Kriwy and Mecking, 2012; Pino, Peluso and Guido, 2012; Zagata, 2012; Stolz *et al.*, 2011; Hughner *et al.*, 2007; Torjusen *et al.*, 2004). The underlying aim of the organic movement was and still is to create a sustainable and healthy food system with a focus on primary production (agriculture), but one that also includes processing and the entire value chain as well as distribution and organic consumption issues and ethics. The Organic Food System (OFS) offers an example of successfully combining sustainable food production and sustainable consumption patterns within one system (Strassner *et al.*, 2015). Based on central findings through surveys and other studies around the world, consumers and producers of organic products share specific attitudes to food that are mainly oriented towards health and environment (Hjelmar, 2011; Verbeke, Scholderer

and Lahteenmaki, 2009, Padel and Foster, 2005). Therefore, the OFSP will bring a shift in focus from the organic agricultural production system to a focus on the whole food chain from primary production to the farm gate and including the organic consumption as part of a (healthy) dietary pattern, thereby linking organic production and consumption. The OFSP brings together initiatives and stakeholders at international, national, regional and local levels. Here the OFS offers a global food system with local multistakeholder initiatives (Willer and Lernoud, 2015). The change in consumption patterns is a crucial issue in the transition to sustainable food systems. Therefore, major questions for shifting food systems towards sustainability focus on how to alter food consumption patterns as well as how to improve the nutritional quality and safety, and related health characteristics of food. The dietary pattern of organic consumers seems to be closer to healthy dietary patterns as well to the sustainable diet concept (Baudry *et al.*, 2015a, b; Eisinger-Watzl *et al.*, 2015; Kesse-Guyot *et al.*, 2013). One of the underlying determinants of organic agriculture and food production is the link between sustainability and health. There are various studies showing a contribution of organic agriculture to global sustainability issues (<http://www.ifoam-eu.org/en/node/3760/>). The organic food market is growing rapidly worldwide (Willer and Lernoud, 2015). Therefore, one goal of the OFSP is to determine the drivers of organic consumption, identify and evaluate organic consumption patterns and translate this learning into tools that enhance and reinforce the necessary changes in lifestyle. In order to achieve this goal, related projects have been and will be further developed within this programme.

THE ORGANIC FOOD SYSTEM PROGRAM

The research association International Research Network for Food Quality and Health (FQH) (<http://www.fqhresearch.org>) initiated the developmental process of the OFSP in Newbury, United Kingdom in spring 2015. During this meeting the main goals and tasks of the OFSP were identified and the major components of the programme were worked out in a group process. Furthermore, the connection and contribution to the FAO/UNEP-SFSP and IFOAM Organic 3.0 were defined and turned into tasks. From then on, IFOAM (<https://www.ifoam.bio/>) and BERAS (<http://beras.eu/>) joined as driving forces in setting up the OFSP as an international initiative bringing together practice and experts from different scientific disciplines. During the European nutrition conference (FENS) in Berlin, Germany (autumn 2015), the partners of the OFSP held their second meeting. During this meeting, the structure of the OFSP was finalized and agreed upon. Furthermore, the work areas as well as some key activities within the project were elaborated and agreed upon, as well as the responsibilities of OFSP and the next steps. During the third meeting in Copenhagen, Denmark (spring 2016), the starting OFSP projects were agreed among the partners. The OFSP was launched during the International Fair on Organic Food, Biofach, Nürnberg, Germany on 10 February 2016 (www.organicfoodsystem.net).

While organic agriculture can be taken as an example of sustainable food production (Reaganold and Wachter, 2016), organic consumption patterns may also be taken as an example of sustainable food consumption (Kesse-Guyot *et al.*, 2013). Sustainable consumption was defined by the Oslo Symposium 1994 and further developed towards

consumer orientation of sustainable food systems (SFSs). The Oslo Symposium in 1994 proposed a working definition of sustainable consumption as “the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardise the needs of future generations”. The FAO definition of sustainable diets raised in 2010 states that: “Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (FAO, 2012). The necessary change in consumption patterns seems to be a crucial issue in the transformation to sustainable food systems. Since food systems shape diets and diets play a central role in shaping food systems, the question of organic food products as a basis for a sustainable and healthy consumption as well as further dietary patterns seems an essential topic to be addressed in parallel to sustainable production adapted to each particular region. Therefore, OFSP will use the organic food system as a model to understand drivers of sustainable food consumption and production and to link this to real-world examples. It is important to understand that the OFSP will use the organic food system as a model or a kind of window for exploration but not as the exclusive solution. There are many commonalities between healthy (e.g. WHO, 2012) and sustainable diets (e.g. FAO, 2012); organic agriculture can contribute to enhance both and may act as a model to bridge health and sustainability. The OFSP will address sustainable food system (SFS) issues in the following challenges

- taking the organic food system as a proposed best practice example;
- delivering tools, information and knowledge for establishing sustainable food systems using the organic perspective and experience;
- contributing to the understanding of what constitutes a sustainable food system based on the key issues from the example of the OFS;
- producing data, methodology and standards for developing, improving and testing SFS on the basis of organic as a tested best practice example.

Cores and work areas of OFSP

The main goal of the OFSP is to aggregate knowledge about the drivers for sustainable food production and consumption. The OFS will be used as a pilot model as it is an existing global food system with clear boundaries, theoretical frameworks including scientific underpinning, data on monitoring as well as set to practise in more than 160 countries. There will be several working areas in order to achieve the goal:

- a) elaborating on lessons learned from organic food systems for sustainable food systems with a focus on sustainable food consumption and production patterns;
- b) identifying, developing and testing tools and indicators for sustainable food systems and sustainable diets, taking organic diets on global and national or regional levels as learning models;

- c) building multistakeholder networks in order to increase the efficacy of implementing tools and indicators of sustainable food production and consumption;
- d) disseminating best practice examples of sustainable food production and consumption on global and national or regional level.

Taking the OFS as a model, the lessons learned can be translated into guidelines, indicators and other tools as well as knowledge to contribute to sustainable food systems. For this, two core activities have been identified for OFSP: “conceptualizing, studying and modelling sustainable food systems” and “sustainable food systems in practice”. Furthermore, there are work areas within the programme; each work area has an objective and provides the framework for developing, realizing and evaluating projects.

Model regions, local sustainable food systems and learning centres within OFSP

The design of global models and the localized projects will give the ability to capture key interactions, processes and features, to better understand the complexity of food systems and make further improvements towards more sustainable production and consumption. Implementation strategies of the OFSP therefore focus on the creation, development and multiplication of local sustainable food systems in model regions. The work in the model region may be performed at national, regional or/and local level. Model regions are supported by a local, globally connected network of researchers dedicated to improving systems and the human experience.

A model region may be a whole country or part of a country, depending on geographical scale, climate, demographics and political context. A defining feature for a model region is the ability and capacity to work at a level that can impact governmental policies. Linking consumption with production expands the concept of a food product or food chain to that of a food system that operates at a territorial level. Good, healthy food and a close connection to its origins could improve life quality by increased awareness about animal and nature welfare, environment and climate changes. Interdependence and mutual support between farmers and consumers mediated through cooperation with processors and traders, and facilitated by supportive public policies and programmes, will ensure a supply of sustainable and healthy food for the population and thereby contribute to both short- and long-term personal and public health. It supports farmers to have economically sound enterprises that also enhance the regenerative power of their farms and surrounding environment, which in turn serves as a basis for local food security and food sovereignty. Support and revival of local systems and economies also positively impact cultural development.

Within model regions, one of the OFSP implementation activities is to enable the establishment of local sustainable food systems (LSFSs) in potentially any location on the planet, under a unified model of co-creation among farmers, processors, traders, policy-makers and researchers. The LSFS are examples of local food clusters that are socially just, environmentally friendly and economically viable – see, for example, Södertälje in Sweden (<http://foodsociety.se/en/>). They involve all actors in the food chain – from farmers to consumers. These are connected to other actors, such as processors, wholesalers, distributors and consumers in local market clusters. Knowledge exchange is

achieved involving the business sector, public authorities, non-governmental organizations (NGOs), research and education. This creates favourable conditions for environmentally friendly food production, sustainable lifestyles and viable communities.

A major contribution to the activities in model regions and LSFS is the establishment of learning centres as living laboratories for LSFS. The learning centres will be developed to reflect the local context in terms of the environmental, societal, cultural, economic and legal framework.

Coordination of actors within OFSs

The OFSP is a growing global network of people, organizations and communities. Practising with a set of common values and taking a commonly recognized approach, they validate their own work and of the movement as a whole. They are able to learn from each other and build the collective work, bringing benefits to themselves and to others. With access to a global network in potentially more than 120 countries, the OFSP represents a unique opportunity for practical implementation that demonstrates the benefits of best practices. Close interrelationships and processes among scientists, trainers, actors in the food chain, NGOs and authorities aim at working together for practical implementation at local and regional levels. Communities will be continuing to identify where best practices in sustainable production and consumption are happening based on the principles of organic agriculture and using the forefront of research on healthy eating habits and related practices and policies. By replicating and multiplying these actions in many communities around the globe, the OFSP becomes a disruptive force for transforming food production and consumption to be truly sustainable. Multiplication globally validates community action locally and enables shared learning and ongoing improvement. The OFSP will facilitate the development and coordination of LSFS and increase their positive impacts partly by focusing on public health and local economies, e.g. through institutional procurement (<http://www.fao.org/ag/ags/ivc/institutional-procurement/en/>), education (including school meals) and job creation supportive of sustainable value chain development. It will enhance cooperation among stakeholders through innovations in transparency, accessibility and credibility of information so that people can understand more about the dynamics of production and consumption, product quality, and activities of the people involved, and the connections between food, culture, agriculture and nature. Organizing LSFS in model regions will enable the global OFSP to engage more people in a coordinated effort to make these sustainable models a systemic global innovation. Contributing to international framework programmes (e.g. 10YFP, IFOAM Organic 3.0) OFSP shows how the benefits attained through organic, agro-ecological, regenerative practices contribute to solving the world's problems and help achieve Sustainable Development Goals. The OFSP takes a holistic approach to description, monitoring and benchmarking of processes and their impacts on sustainability and human health, using a transdisciplinary, participatory approach.

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Voluntary certification system on good agricultural practices for fresh consumption products

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ABSTRACT

In the frame of the REPCar project in Costa Rica (*Reduciendo el Escurrimiento de Plaguicidas al mar Caribe*), the Ministries of Agriculture and Environment agreed on the need to create the system of voluntary certification in good agricultural practices for fresh agrifood consumption. The system considers three parts of agricultural chains: production, processing and marketing. A set of criteria – control points – are applied for each phase, which can be either mandatory, critical or recommended.

It is a multi-objective system, focused on the certification of agricultural products free of agrochemicals, from production processes that apply good agricultural practices concerning natural resources and inputs. Trained technicians from the Ministry of Agriculture and Livestock annually audit the system on-farm. Producers who meet the mandatory control points receive a certificate issued by the Ministry.

SUSTAINABLE DEVELOPMENT AND GOOD AGRICULTURAL PRACTICES IN COSTA RICA

The agriculture sector in Costa Rica is very important for the sustainable development of the country. Among other reasons, because it contributes almost 13 percent of the GDP, provides employment for more than 12 percent of the economically active population, and ecosystem services including food security for the population (SEPSA, 2016). It includes more than 93 000 farms on 2.4 million hectares (INEC, 2014).

It has been involved in transformative processes for sustainable food systems since the beginning of the 1990s. During the first ten years, several initiatives were developed, such as pilot experiences on soil and water conservation, biodiversity improvements through diversification of activities, both on-farm and at microwatershed level, agroforestry, low external input systems and capacity building in farmer organizations, among others.

In the frame of the national policies on sustainability and competitiveness of the agriculture sector in Costa Rica, during the first 15 years of the twenty-first century, the private sector has been actively innovating to be part of good agricultural practices schemes. Both private initiatives and governmental programmes and projects have contributed to the development of sustainable food systems in the most important agrochains in the country: coffee, banana and pineapple. In 2008, the Ministry of Agriculture and Livestock launched

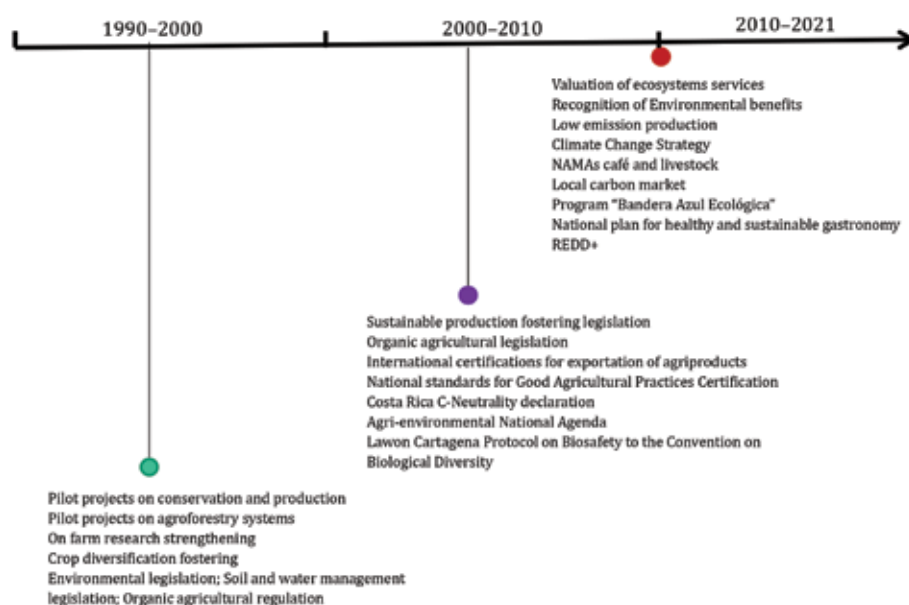


Figure 1. Relevant milestones in the agricultural production sector in Costa Rica 1990–2021

Source: Author, 2015.

the first technical document on good agricultural practices¹ containing the general issues to be applied in all agricultural activities.

For the local market, but also for international trading, several initiatives contribute to sustainable value chains for sustainable food systems, through public–private efforts.

VOLUNTARY CERTIFICATION SYSTEM ON GOOD AGRICULTURAL PRACTICES

In the frame of the REPCar project in Costa Rica (REPCar, 2011), the Ministries of Agriculture and Environment agreed on the need to create the system of voluntary certification in good agricultural practices for fresh agrifood consumption. The system considers three parts of agricultural chains: production, processing and marketing. For each phase a set of criteria – control points – are applied, which can be either mandatory, critical or recommended.

As a result, the Ministry of Agriculture and Livestock started to promote a public voluntary standard for good agricultural practices certification,² considering production, environment and health (workers and consumers). The standard consists of a set of principles

¹ Good Agricultural Practices. They are all practices in agricultural production to prevent or reduce environmental damage, ensure adequate productivity of agricultural activities and obtain safe products for people who consume them. They apply from the farm to the processing plant, including the stages of preproduction, production, harvest, transport, storage, sorting, washing, packing, storage and delivery in the consumer distribution place (MAG, 2008).

² <http://www.sfc.go.cr/SitePages/Residuosdeagroquimicos/Certificacion-Voluntaria-BPA.aspx>

and technical recommendations for the production, processing and transportation of food, designed to ensure the protection of human health and the environment, using environmentally safe and economically feasible methods resulting in securing safer and healthier food products.

The standard is a multi-objective system, focused on the certification of agricultural products, free of agrochemicals, from production processes that applies good agricultural practices concerning natural resources and inputs.

Trained technicians from the Ministry of Agriculture annually audit the system. Producers who meet the mandatory control points receive a certificate issued by the Ministry.

The experience started in the frame of a public–private initiative based on the request of a local chain of supermarkets³ in Costa Rica, which owns supermarkets and convenience stores in the central valley and in touristic places on the Pacific coast.

The initiative is a public–private experience led by the Department of Sustainable Production and the Department of Chemical Residues Control of the Ministry of Agriculture and Livestock in the frame of a request made by a food marketing company. It includes producers and providers of fresh fruit and vegetables.⁴

The process begins with a request by the marketing company of the products, for the producer's incorporation into the programme of good agricultural practices. The producers must participate in a training programme on the topics included in the standard.

Once the training programme is finished, the phase of advisory and monitoring of progress in the field is begun, which is executed by extension service personnel from the Ministry of Agriculture and Livestock. When the producers have implemented the good agricultural practices according to the specific necessities of each farm to meet the mandatory control points of the standard, the marketing company notifies the Department of Sustainable Production of the Ministry of Agriculture and Livestock to proceed with the inspection for verification of the control points' fulfillment.

If the producer has met 100 percent of the mandatory control points, the inspection generates a report to the Department of Chemical Residues Control to continue to the following step, which is the sampling of fruit and vegetables for official laboratory analysis to determine the existence of agrochemical residues. If the test results indicate the presence



Figure 2. Farmer participants in the initiative, in a training course on agro-ecology

Source: R. Azofeifa.

³ <http://www.automercado.cr/tag/sostenibilidad/>

⁴ <http://revistaproagro.com/auto-mercado-incentiva-mejores-proveedores-costa-rica/>

of chemical residues above the allowed limitation, the producer or supplier of the products does not receive the certification.

The certification has to be re-validated annually.

SUCCESS AND CHALLENGES

The initiative has resulted in important advances, which consolidate a new scheme of production and trading of fresh agricultural products for the local market in Costa Rica. Fifteen enterprises of small farmers and providers of fresh fruit and vegetables for the local supermarket chain Auto Mercado are participating in the certification process and the number of producers is increasing. From the perspective of Auto Mercado, the experience has been very positive in terms of positioning and is changing the way of working to provide benefits to farmers and consumers. The initiative has encouraged the producers to work in an orderly manner, has raised awareness on working properly with the environment, gives greater assurance of safety and a better understanding on how the initiative generates order for providing integrated management of crops and farm activities. Undoubtedly, it has generated a habit of control and monitoring activities applications, pesticide management, proper organic residues management and others, so the contribution to improving the environment is essential.

Despite the success of the initiative, there are three important subjects requiring improvement.

- a. One crucial issue is raising consumer awareness. Through consumer information actions developed by the supermarket chain, it is important to bring information to final consumers about the production process and the attributes of the products in terms of safety and nutrition characteristics. Scaling of the experience will depend on consumers' decisions and awareness. The experience would be scaled up and more producers would be encouraged to engage in voluntary certification on good agricultural practices if consumers were aware about the importance of consuming certificated products. Scaling up the experience will depend on the decisions and consumer concerns regarding the importance of eating healthy and nutritious products. This entails an effort in education and consumer information.
- b. The second aspect is with regard to on-farm registers. For the traceability of the process, farmers must have registers about the date of cropping and harvest, practices for crop nutrition and sanitation, inputs used for production and processing, quality of water used for irrigation and product processing, and all the information necessary to demonstrate the safety of the products and to identify risks in the production process. This represents a new culture of production that has not been part of the farmers' practices, and which requires a major effort to strengthen it.
- c. The last but not less Important is the metrics of process. Although certification of good agricultural practices to produce nutritious and safe food must be a mandate, the reality is that achieving changes in the culture of production of the producers, especially when it comes to small producers, requires demonstrable

results. On this basis, the generation of data showing the results, especially economic, on sustainable management of agrifood systems, is a very important tool. It is necessary to establish a system of evaluation of economic and environmental outcomes that will contribute to the development of sustainable food systems.

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Ireland's Origin Green programme: taking a national approach to food sustainability

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This paper has been adapted from a forthcoming case based on Ireland's sustainability programme (Origin Green) and its relevance for developing countries.

ABSTRACT

In 2012, Ireland became the first country in the world to introduce a nationwide sustainability programme for its food and drink industry. Entitled Origin Green, the programme aims to engage food producers on a journey of continuous improvement in the sustainability of food production. Today, over 110 000 farms have been carbon assessed and over 85 percent of Ireland's food export value is produced by Origin Green-verified members. This presentation will share Ireland's experiences, the lessons relevant for other sustainability programmes and the challenges ahead.

INTRODUCTION

Current systems of food production, the way our food is grown, processed, transported, consumed and wasted, exert extensive pressure on the environment. A growing population and urbanization will aggravate the pressures on food production and natural resources. By 2050, FAO estimates that population growth will require food production to be increased by 70 percent (FAO, 2009). Increasingly strained resources such as land, fertile soil and fresh water will challenge production increases. Developing sustainable agriculture and food systems is imperative for achieving food security, for eradicating hunger, malnutrition and poverty and to prevent further environmental degradation.

Given the scale of these challenges, more collaboration has been evident across sectors and between private and public actors, with the goal of improving food system sustainability. Ireland's Origin Green programme has been identified by FAO as an initiative that is attempting to improve the sustainability of the country's entire food sector. Although a voluntary programme, it has achieved a wide uptake from across the industry actors and thus the experience provides valuable insights for other countries and sustainability programmes. Ireland's largely family farming-based structure with low-input usage, small domestic market and history of exporting non-value added commodities provides particular relevance for developing countries.

WHAT IS ORIGIN GREEN

In 2012, Ireland became the first country in the world to launch a nationwide programme aiming to mobilize its entire food and drink industry into becoming a world leader in sustainability. Entitled Origin Green, the programme intends to engage all farm and factory producers on a journey of continuous improvement in the sustainability of production. It is the only initiative of its kind to operate on a national basis, uniting government and industry. It is coordinated through the Irish Food Board, Bord Bia. Today, over 85 percent of Irish food exports are produced by Origin Green verified members and over 110 000 farms have been carbon assessed. As a voluntary and nationwide programme, Origin Green is unique in its uptake among food companies and wide engagement with farmers.

IRISH AGRICULTURE, POLICY AND INSTITUTIONAL CONTEXT

Agri-food is Ireland's largest indigenous industry, contributing €26 billion to the national economy (DAFM, 2014a) and generating 12.3 percent of merchandise exports. The industry accounts for 8.6 percent of total employment (DAFM, 2014a) with a significant contribution in rural areas. The sector has ambitious growth targets as outlined in the Government's agricultural strategies (explained later).

"Meat and livestock" and dairy account for the largest share of Ireland's food exports, 34 and 30 percent, respectively, in 2015. The production system for these is a primarily pasture-based extensive grazing system. This system and low levels of water stress lend a natural advantage in terms of sustainable livestock production. An EU Commission's Joint Research Centre report in 2011, found that Ireland had the lowest carbon footprint per unit of milk produced and the fifth lowest carbon footprint per unit of beef produced across member states.

Nevertheless, livestock production is recognized as having major environmental consequences. Water resources are affected in numerous ways by livestock agriculture. Biodiversity and habitat loss resulting from livestock production is generally accepted as being significant (Machovina, Feeley and Ripple, 2015). Much of the concern over livestock production relates to climate change and the high level of greenhouse gas (GHG) emissions produced. In Ireland, the agriculture sector accounts for over 30 percent of national emissions. It is likely that there will be further pressure on agriculture to reduce emissions as countries look to address climate change and meet the targets of the Sustainable Development Goals. Origin Green thus aims to engage the entire Irish agri-food sector in reducing emissions and improving sustainability. The programme presents a way for producers to turn growing compliance into an opportunity and use the independently verified credentials of Irish produce as a differentiator in the marketplace.

POLICY ENVIRONMENT

Ireland is subject to EU legislation and policies aimed at limiting the negative environmental impacts of agriculture. Water quality has been a priority area of focus, and is the subject of two EU Directives:

- The Nitrates Directive (1991) aims to limit the pollution of water sources from nitrogen fertilizers (DHPCLG, n.d.).

- The Water Framework Directive, established more recently, addresses many additional objectives to defend and restore the function of rivers, lakes, estuaries, coastal waters and groundwater (The Water Framework Directive, n.d.).

Ireland's target for agricultural emissions' reduction under the EU's Effort Sharing Decision¹ is 20 percent by 2020. The Common Agricultural Policy (CAP) can also support environmental protection by providing direct supports for cross-compliance with other environmental legislation (European Commission, 2010).

INSTITUTIONAL ACTORS

The **Department of Agriculture, Food and the Marine (DAFM)** is responsible for regulating and supporting the agricultural sector of Ireland and oversaw the development of two instrumental strategies for the future of the agri-food industry; both aim to substantially increase agricultural output value. Food Harvest 2020 (launched in 2010) aims to increase beef output value by 20 percent and dairy production by 50 percent by 2020 (DAFM, 2010). Food Wise 2025 (launched in 2015) develops this strategy further and highlights the importance of achieving production goals in an “environmentally sustainable manner”, a view also endorsed by the policy document Our Sustainable Future (DEGLC, 2015).

Bord Bia (the Irish Food Board) is a state-sponsored commercial agency closely linked to agricultural policy formulation and promotes Irish food, drink and horticulture. Bord Bia launched and coordinates the Origin Green Programme.

Teagasc (the Agriculture and Food Development Authority), assisted in developing Origin Green's farm level interventions based on a body of research on efficiency of production appropriate to the Irish context. A carbon feedback tool for farmers is part of the knowledge transfer activities under the rural development program 2014–2020 (DAFM, 2014b).

MARKET OPPORTUNITIES FOR SUSTAINABLE PRODUCE

Alongside the policy impetus, a core driver of Origin Green's development was the potential business opportunity for Irish produce that Bord Bia recognized arising from increasing demand for sustainable products. The world's major food companies are taking action to increase the sustainability of their supply and operations. A significant motivation for food companies is to protect the supply of essential raw materials and the skills of those who produce them, to ensure the continuation of their businesses. Major companies such as Unilever, McDonald's, Nestle and Coca-Cola, are all making ambitious public commitments as regards sustainability and are reliant on their suppliers to help them achieve these. Unilever, for instance, is committed to sourcing 100 percent of its agricultural raw materials sustainably by 2050. McDonald's began purchasing a portion of its beef sustainably in 2016.

Having independently verified proof of sustainability credentials leads to business opportunities for Irish produce as the interest in sustainable sourcing continues to rise.

¹ The Effort Sharing Decision sets out binding annual GHG emission targets for Member States for the period 2013–2020. These targets concern emissions from most sectors not included in the EU Emissions Trading System – transport (except aviation and international maritime shipping), buildings, agriculture and waste.

McDonald's, for example, sources 20 percent of the beef burgers they sell in Europe from Ireland. It wanted to have a verified sustainable² beef source and Origin Green offered an ideal fit for its requirements. Companies like this are not just premium customers offering major business opportunities. As market leaders their actions indicate the direction in which the wider industry is going. To compete in a global market and attract premium customers, it will be necessary for producers to prove their sustainability credentials.

WHY ORIGIN GREEN IS AN INTERESTING CASE FOR DEVELOPMENT

As a voluntary programme, led by an organization with a facilitating role in the food industry, the extremely wide industry participation achieved by Origin Green is an interesting case for policy-makers. Additionally, the experience demonstrates a compelling business case for sustainability in food value chains. Transitioning to a sustainable global food system will require the continued actions of millions of actors in food value chains across the globe. To effectively change behaviour, sustainable practices and processes must provide incentives to producers along the value chain. From the outset, Origin Green has focused on the benefits for stakeholder groups in the chain in order to maximize adoption of the programme.

The profile and economic importance of Irish agriculture holds particular interest for the agri-food sector in developing countries. The Irish farming system is largely comprised of family farms and farms are relatively small in an international context. There are over 140 000 family farms in the country, with an average size of 32.7 hectares. By comparison, the mean farm size in the United States of America is 178.4 hectares and in South America 111.7 hectares (OECD, 2015). In Ireland, the average dairy herd is about 60 cows. The Origin Green experience demonstrates that environmental sustainability can make economic sense even on small, low-input farms.

DEVELOPING THE PROGRAMME

Origin Green was conceived during the post-2008 global financial crisis, one that hit the Irish economy particularly strongly.³ As Ireland's largest indigenous sector, agri-food was identified as a potential platform for wider economic growth. Following wide stakeholder consultation across the industry, Ireland's ten-year Governmental agri-food strategy set the ambition of growing Ireland's food exports to €12 billion by 2020, a 42 percent increase compared with the 2007–2009 average. Two research pieces, outlined below, contributed to sustainability featuring heavily in the Government's strategy, which was built around three core pillars – smart, green and sustainable growth.

Sensing a growing importance of sustainability in the marketplace, Bord Bia commissioned PwC research into the sustainability initiatives and expectations of several major international

² Sustainability is a contextual term and is often used to describe products, situations or processes that are more sustainable as opposed to truly sustainable. There are various standards that will assess sustainability based on different criteria – for example the environmental impact of production, the distribution of value along a production chain and so on. Standards may be set and evaluated by an independent organization like Fair Trade, set by industry collaboration, or a company may set its own definition of sustainable production with its own criteria.

³ The annual unemployment rate jumped from 4.7 percent in 2007 to a peak of 14.7 percent in 2012. Ireland's gross debt to GDP ratio, which was below 25 percent in 2007, hit a peak of 120 percent in 2013.

retailers and food companies. The research concluded that sustainability would grow in importance and in scope and would be just as vital as food safety to trade customers and consumers. An evolution from quality assurance to environmental assurance was becoming evident. Sustainability issues were not yet well understood by consumers; local, animal welfare, Fair Trade and organic were those best understood thus far. Trade customers were working on carbon and felt that the next big issues would be water, pesticides and biodiversity.

The notion of an umbrella brand was introduced by two consultants from the Harvard Business School, commissioned by Bord Bia, to conduct a high level review of the Irish industry. The review suggested that given Ireland's small scale and its production capabilities, Irish producers should unite and put the message to the market that "we are natural⁴ and can prove it". The review was presented at a "Food Summit" on the future of the industry convened by Bord Bia with stakeholders from across the full spectrum of the industry (Shelman *et al.*, forthcoming).

Stakeholder collaboration has been an essential enabler of the Origin Green programme. Industry stakeholders were involved in both the strategic direction and the technical detail of the programme. The committee leading the development of the Government's agri-food strategy was made up of industry and farmer group representatives, economists, Government and state agency representatives, environmental and union representatives. The environmental representation comes from the Environmental Protection Agency (EPA) and Birdwatch Ireland. Given the significant impact of Irish agriculture, some commentators suggest that the committee should be balanced with more environmental organizations represented. The farm sustainability assessment development is overseen by Technical Advisory Committees, which include Bord Bia, Teagasc, the Food Safety Authority of Ireland, DAFM, industry (producers and processors) and other technical experts. This serves to ensure that the programme is both ambitious and practical and its success is evident in large programme adoption numbers.

Ultimately, it was decided to launch a business-to-business brand that set out to both showcase and provide evidence of Ireland's sustainability credentials. Given the continuously evolving perceptions of sustainability indicated by Bord Bia's research, Origin Green would have all programmes and measures focusing on continuous improvement rather than meeting specific standards. The programme offers verification of sustainability of process versus sustainability of product.

THE ORIGIN GREEN FRAMEWORK

Between 2009 and the launch in June 2012, Bord Bia set about building both the scientific models and the business case for Origin Green. Beef and dairy were Ireland's most valuable export sectors, and had the largest environmental impact, so efforts were first

⁴ Natural here is a marketing message, speaking to the perception that Ireland's grass-based production system is "closer to nature" than intensive feedlot production systems.

concentrated here. Bord Bia worked with the Carbon Trust⁵ to develop PAS 2050⁶ accredited carbon footprint models, starting with beef and followed by dairy. The United Kingdom's Cranfield University was engaged to establish the water footprint for Irish beef and dairy produce.

To advance the business case, Bord Bia conducted a full review of the sustainability needs of consumers and trade customers internationally. This provided evidence of current and expected market demands in terms of sustainability. A pilot with ten initial companies was launched in 2012, through which the framework for companies to build their Origin Green plans was developed. The necessity to define sustainability for different stakeholders and to make it tangible to their businesses emerged in the pilot period.

To get buy in from both farm and company producers, Origin Green initially focused on efficiencies – areas where environmental and economic objectives overlapped. A marginal abatement cost curve (MACC),⁷ modelled by Teagasc, evaluated and ranked climate change mitigation measures from cost-beneficial to cost-prohibitive and estimated the magnitude of each measure's mitigation potential. Potentially cost-beneficial measures to farmers were selected for inclusion in Origin Green.

With companies, Origin Green similarly approached sustainability in areas of immediate financial gain – resource efficiency within the business. Once companies understood the concept and how it could benefit their business, Origin Green expanded the definition, first looking at sourcing and certification, then broadening the conversation around what companies were doing in their local communities and then considering their products from a health and nutrition perspective.

A core objective of Origin Green is to deliver value for Irish products in the global market place. This connection to market demands for sustainability was vital in persuading stakeholder groups of the value of the programme. Producers wanted to know what programme participation was going to deliver for them and for their products. Bord Bia had to convince them of how it would be investing in Origin Green, how the programme would enable engagement with key customers and how it expected Origin Green to deliver in the marketplace – not necessarily giving a premium price, but giving access to premium customers on a consistent basis. Convincing each group (manufacturers and farmers) of the overall vision and of the benefits that it would bring to their business, through efficiencies and market differentiation, was key to programme adoption.

HOW THE PROGRAMME WORKS

Origin Green provides a framework for producers to understand the impact of their business from a sustainability perspective and how they can manage that impact. The programme

⁵ The Carbon Trust is a UK-based, not-for-dividend company that helps organizations reduce their carbon emissions and increase resource efficiency.

⁶ PAS (Publicly Available Specification) 2050 builds on existing life cycle assessment to specify requirements for the assessment of the life cycle GHG emissions of goods and services. Its intention is to provide organizations, businesses and other stakeholders with a clear and consistent method for the assessment of the life cycle GHG emissions associated with goods and services.

⁷ A MACC “visualizes the abatement potential of GHG mitigation measures, and the relative costs associated with each of these measures”.



Figure 1. An illustration of Origin Green Programmes across the food value chain

helps them to set and achieve measurable sustainability targets, with independent verification to give credibility. It initially operated at two levels, farm and factory level, offering customers of Irish food and drink visibility into their whole supply chain. In 2016, Bord Bia is implementing an additional version of Origin Green for retailers and food service companies (Figure 1).

Farm level

At farm level, Origin Green assesses sustainability through individual farm audits, which build on Bord Bia's existing quality assurance infrastructure. Previous quality assurance audits assessed traceability, food safety, welfare, environment and animal health on farm. The Origin Green assessments are conducted every 18 months and the expanded scope now includes energy, GHG emissions, water, biodiversity and socio-economic data. European Standard Product Certification – ISO 17065⁸ gives independent, international accreditation. Sustainability assessments were first implemented on beef and dairy farms. By end of 2016, it is expected that all primary agriculture product sectors (e.g. pig, poultry, lamb and grain) will be undergoing individual sustainability assessments on their farms.

Aiming to minimize the burden of compliance for farmers, Bord Bia examined what existing data sources might be able to provide some of the information required, during programme design. Two national databases were identified as holding animal profile information relevant to farm sustainability, such as calving rates and daily liveweight gain. Drawing necessary data from these sources avoids duplication of effort by the farmer and by the different organizations. With the farmer's consent these data are combined with information collected on farm, including grazing season length, manure management, animal diets and fertilizer use. Bord Bia, DAFM and Teagasc all have access to the combined database, managed by Bord Bia.

The Origin Green programme recommends practical ways farmers can improve environmental performance, such as increasing the length of the grazing season and reducing fertilizer use. A key driver of engagement with the programme is the measurement and translation of these sustainability-improving actions into financial gains for farmers (see Figure 2). This is enabled by the Carbon Navigator, a software tool developed by Teagasc and Bord Bia, which provides feedback and defines practical ways of improving environmental performance in terms of economic benefit for the farmer.

⁸ ISO 17065 – Conformity assessment -- Requirements for bodies certifying products, processes and services.

Measure	Potential Impact
<ul style="list-style-type: none"> • 10 day increase in length of the grazing season 	<ul style="list-style-type: none"> • Cut emissions by 1.7% and boost performance by up to €27 per cow.
<ul style="list-style-type: none"> • A reduction in N fertiliser of 10kg per hectare 	<ul style="list-style-type: none"> • Reduce farm emissions by 1% and improve income by €10/ha.
<ul style="list-style-type: none"> • 20% shift to spring slurry application 	<ul style="list-style-type: none"> • Reduce farm emissions by 1.3% and reduce fertiliser costs.
<ul style="list-style-type: none"> • Improving the calving rate by 5% 	<ul style="list-style-type: none"> • Reduce emissions by 5% and boost income by over €40 per cow.
<ul style="list-style-type: none"> • Increase lifetime average daily weight gain by 100g 	<ul style="list-style-type: none"> • Reduce emissions by 1% and boost income by around €63 per head.

Figure 2. Measures included in the Carbon Navigator and potential benefits

Source: Teagasc.

Farmers have consultations with an advisor through Teagasc's knowledge transfer programme. Advisors work with farmers to identify areas for further improvement and three- to five-year targets can be entered into the Carbon Navigator, giving a goal to work towards. Sustainability is a key part of the knowledge transfer services. For instance, farmers receive payment for attending six knowledge transfer sessions as part of the Beef Data Genomics Programme (BDGP),⁹ which also cover sustainable farming.

Financing at farm level

Funds are not specifically made available to farmers under the Origin Green programme; however many of the actions advocated by the programme are intended to reduce costs. Under the EU's.

Rural Development Programme (RDP)¹⁰ payments for agri-environment-climate commitments are made available through two schemes: the Green Low-Carbon Agri-Environment Scheme (GLAS)¹¹ and the Beef Data and Genomics Programme (BDGP). A

⁹ The BDGP aims to address climate change by breeding for improvements in the beef herd that will result in reduced emissions intensity.

¹⁰ The RDP is part of the EU's Common Agricultural Policy (CAP) and promotes the sustainable development of the agriculture sector based around six EU priorities including; the promotion of "resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors".

¹¹ This scheme encourages agricultural actions, "which introduce or continue to apply agricultural production methods compatible with the protection of the environment, water quality, the landscape and its features, endangered species of flora and fauna and climate change mitigation".

total of 30 percent of direct payments are linked to environmentally-friendly agricultural practices such as crop diversification, the maintenance of permanent grassland and conserving ecological focus areas.

Impact at farm level

Origin Green was launched in June 2012, meaning that there is less than four years of data available even for the first farms assessed through the programme. Sustainability assessments on farm are undertaken every 18 months, and the schemes for individual agriculture sectors were launched at different times. For example, the Sustainable Dairy Assurance Scheme was launched in December 2013, whereas beef assessments started in 2010. Only a portion of farmers will have undergone a second assessment of the sustainability of their farm. Additionally, a period of five to ten years would be necessary to assess any real changes in environmental impact. Changes over shorter periods could be skewed by variable weather conditions affecting farming practices. The small sample size so far is also insufficient to generate the statistical power needed to observe any significant changes.

The sustainability assessments have enabled Bord Bia to plot the distribution of the footprint of beef and dairy farms. Data on environmental progress have not been published. However, the 2015 Origin Green Sustainability Report (Bord Bia, 2015) asserts that moving the lowest (environmentally) performing farms in line with the average performance would reduce emissions annually by one million tonnes of CO₂ equivalent.

Teagasc (2012) report that achieving the climate change mitigation potential identified by its MACC model would result in a 4.5 percent reduction in agricultural emissions compared with 2005 levels in a scenario where the 2020 agri-food growth targets are achieved. This would be a substantial undertaking and leaves a significant gap to Ireland's EU target of 20 percent for this period. The large number of farms participating in Origin Green does provide a potential platform for wide-scale improvement. However, Teagasc's findings are relevant for national climate and agricultural policy, in terms of complementary programmes and policies necessary to achieve climate targets.

Factory level

At manufacturing level, companies develop three- to five-year year sustainability plans, with measurable targets in the areas of raw material sourcing, manufacturing process and social sustainability. These targets and progress towards reaching them are independently assessed and verified on an annual basis by the leading verification company SGS.

To join the Origin Green programme, a company's CEO must sign up to the Origin Green Charter (Figure 3), which defines a minimum number of targets from each of the three target areas that must be included in each plan. It is essential for each company to set one stretch target – the achievement of which would require a substantial effort over a period of time. The framework gives companies some flexibility to build their plan around the targets that are most relevant to their business and their stakeholders, within specified parameters. This reflects the diversity of companies in the Irish Food industry and the ambition of getting all companies involved and improving on sustainability.



Figure 3. Targets under the Origin Green Sustainability Charter

Source: Bord Bia.

Every plan and subsequent annual progress reports are independently verified by SGS to ensure targets are robust and progress can be tracked on a continuous basis. Once a company's plan has been accepted, the company achieves the status of a fully verified member of the programme.¹² At the time of writing, over 500 companies have signed up to the Origin Green Sustainability Charter with over 190 plans accepted. These accepted plans account for over 85 percent of Irish food and drink exports.

Origin Green's value proposition for companies is, similar to farm level, rooted in the benefits that action on sustainability will bring to their business. Programme communications focus on the opportunities to differentiate Irish produce in the marketplace based on its sustainability credentials, the potential cost savings through resource efficiency and the business benefits that individual members have experienced through programme participation. To further push participation, the organization is also continuously expanding the number of its services that require Origin Green membership for access, for example participation in trade shows and Bord Bia-run events.

The most frequent benefits identified by Origin Green members on what the experience has brought to their business were education, communication and cost savings (Bord Bia, 2014). The main constraint is finding the time and resources to focus on improvement. By going through the planning process, companies say they have been able to understand where they can have an impact and where those impacts will have a positive effect on their business. Sustainability is becoming increasingly important to trade customers and having independently verified credentials helps companies to demonstrate the progress they are making. Finally, by managing inputs and waste more efficiently, companies are seeing cost savings.

Financing at company level

Companies must cover the costs of verification of their own Origin Green plan and subsequent annual reports; these are €700 in year one and €350 for every other year. Smaller companies can apply for a grant from Bord Bia to help with this cost.

¹² On average companies will have to submit their plans three times before they are approved.

Impact at company level

Similarly to farm level, real results take time and companies embarked on their sustainability plans at very diverse stages. Origin Green released its first sustainability report in November 2015, attempting to reflect the impact achieved to date from across programme participants. Reporting on aggregate impact when companies may have different base years is tricky. In the main, the base year used was 2012. Though Origin Green is an industry-wide initiative, companies also have targets in different areas so progress against any one given target would not reflect the membership as a whole but only those companies which have set themselves a target in this specific area.

In terms of relative targets, e.g. consumption per unit of output, companies have already achieved some significant reductions with improving projections for 2017. There was an 11 percent reduction in energy usage per unit of output in 2014 relative to the base year of company plans. GHG emissions were reduced by over 10 percent per output unit over the same period. However, growth in the dairy sector resulted in absolute emissions increasing 7 percent since the base year, despite a 16 percent decrease in emissions per unit in that sector. By 2017, it is expected that some absolute reductions will be achieved. For example, if companies with GHG targets reach these stated goals, overall emissions will be 3.9 percent lower among the group.

Origin Green for retail and food service

In 2016, Origin Green adapted its company programme, offering a designated programme for retailers and food service companies. The participation of these companies extends the reach of Origin Green further across the value chain and will create a demand for increased action on sustainability from actors upstream in their supply chains. The first such company to achieve Origin Green status, in May 2016 is Musgraves, an Irish grocery retail and wholesale company, which owns Mace, Centra and SuperValu stores, among others. Musgraves sources from over 2200 Irish suppliers. Its participation strengthens the pull for these companies to make progress on sustainability.

INDUSTRY-LEVEL IMPACTS

It is difficult to quantify the contribution of Origin Green to the growth of the industry; however industry has been on a growth trajectory since before the programme was launched and this is projected to continue. Although not actively measured, anecdotal evidence suggests that there are also positive spillover effects from the commitment to sustainability at the industry and governmental level. Many companies have created new roles that are linked with sustainability. Due to the number of companies in the same industry focusing on their sustainability efforts simultaneously, services providers and providers of environmentally efficient equipment have reported growth in demand. It is also likely that green jobs in the sector have grown as companies launch and expand sustainability initiatives. However, this is not currently being tracked.

Enterprise Ireland, the government agency responsible for attracting Foreign Direct Investment from food companies into Ireland, suggests that Origin Green is also helping to

enhance Ireland's attraction as an investment location. The organization sees Origin Green as putting scientific evidence to Ireland's traditional marketing messages of "green" and "natural" of Irish produce. The sustainability credentials of Ireland's raw materials supply have become a core part of Enterprise Ireland's pitch to food companies and sustainability is a message that resonates globally. The argument is particularly interesting to producers of high-value products such as infant formula and whisky where a clean supply source and/or robust quality and traceability systems are absolutely vital to the business.

PROGRAMME FINANCING

The majority of funding for the Origin Green programme is financed from the Bord Bia budget. The annual marketing budget is roughly €3.5 million and there is a technical budget to integrate sustainability across all of Bord Bia's quality assurance schemes. The technical implementation of the programme is the biggest ongoing cost: for example the farm assessments will cost approximately €5.5 million in 2016. During the development of Origin Green, the largest costs were the time invested in programme development and the employment of outside expertise.

An executive education Origin Green Ambassador Programme is jointly financed by Bord Bia and eight corporate sponsors from the Irish food industry. Run in conjunction with the UCD Michael Smurfit Graduate Business School in Dublin, ten young professionals are selected on a bi-annual basis to undertake an MSc in Business Sustainability and to grow awareness and develop knowledge for Origin Green internationally. The programme intends to build a pipeline of talent, with the necessary sustainability and management skills for the Irish food and drink industry. During the two-year programme each Ambassador undertakes three five-month placements in leading international food companies such as Unilever, Nestle, and Coca-Cola and international agencies such as the Food and Agriculture Organization of the United Nations and the World Bank. The intention is to share the lessons from Origin Green's experience and to learn about best practices from sustainability leaders.

LESSONS

(i) Multi-stakeholder involvement in design and implementation is a key success factor

Wide stakeholder collaboration has been a key enabler in Origin Green and for the Government agri-food strategies. DAFM maintains that having diverse representation involved from the beginning of strategy formulation strengthened its effectiveness as each group had ownership through their input.

For Origin Green, designing a programme that would really effect change required the perspectives and expertise of stakeholders from across the industry. Stakeholders are involved in the technical aspects as well as the overall strategy. This is key to making sure that the standards are sufficiently ambitious but also can realistically be implemented.

(ii) Sustainability linked with food safety

Bord Bia built sustainability assessments on farm into its quality assurance audits, which assess food safety and traceability. The presence of this existing, robust infrastructure was the main facilitating factor here. However, trade customer market research had also found that customers thought that sustainability would become just as important as food safety in the future. Bord Bia viewed traceability, health and welfare as sustainability issues and the systems needed to assess these features also form the foundations for assessing the sustainability of a process/product.

Developing countries would not have the level of food safety infrastructure that has been built up in Ireland over the last 20 years. However, smart investments and interventions can improve both food safety and sustainability in tandem and may result in higher economic output. FAO's (2004) intervention in the ndagala value chain in Burundi is one example of this. Here the introduction of raised mesh wire drying racks reduced both the risk of disease and food losses as the fish dried faster (than on the sand), could be protected from rain quicker and were less likely to be eaten by insects.

(iii) Minimizing the burden of compliance on farmers

Though necessary for assessing the sustainability of food production, complying with farm-level audits puts a costly burden on farmers, which can be exclusionary in the case of smaller farms.

Through its design and through working with potential customers, Origin Green has tried to minimize the burden of compliance for farmers. The programme shares farm data between Teagasc, DAFM and Bord Bia in order to ensure there is no duplication on nationally-run audits and to prevent the same questions being asked to farmers multiple times. Farmers organization participation in the development process contributes to make the schemes as user-friendly for farmers as possible.

(iv) Design informed by extensive market research

The Origin Green programme was informed by market research into the perspectives on sustainability of both trade customers and consumers. The results provided a knowledge base on what the spectrum and significance of demands regarding sustainability are in the marketplace today and how these are likely to develop. An overall ambition of Origin Green is to give Irish produce an edge in the marketplace. This research helps ensure the programme will satisfy customer expectations, and informs design with the key issues to be addressed for the programme investment to remain relevant now and in the future.

This research also helped to build the business case for various stakeholder groups through assessing the market demand. Such research would have been cost-prohibitive, especially for smaller companies, but is universally useful in giving companies insight to assess whether sustainability is something the company should put resources towards.

(v) Communication always focuses on the business case

A crucial aspect in engaging so many farm and factory producers in the voluntary Origin Green programme is the communication of the benefits that sustainable practices will bring to their business. The messages to farmers and food companies

always focus on the potential of Origin Green to drive a preference for Irish food and drink in global markets and on the potential cost savings through resources efficiency. For actors in developing countries, even where there may not be consumer demand or the obligation to meet higher sustainability standards for export, the ability to reduce costs through resource efficiency is still a strong proposition. The cost of energy in food processing is significant; research in the United Kingdom found that energy is the fourth highest cost in meat plants after raw materials, waste management and labour.

(vi) Scientific research based on local circumstances and supported through knowledge transfer

Origin Green's development has been informed by scientific research based on local circumstances, and thus is advocating specific actions that will make an impact in the conditions present in Ireland, and across specific agricultural production systems. Feedback ranking the farm's performance is linked to the sustainability assessment and provides a framework for improvement. The high levels of adoption of the Carbon Navigator tool suggest the effectiveness of its approach as a mechanism for knowledge transfer.

FAO's research into the barriers to adoption for climate-smart agriculture practices found that farmers were receiving multiple and differing pieces of advice from different organizations and hence were hesitant to change their practices. Origin Green tries to ensure that messages to farmers are consistent in order to drive behaviour change. Teagasc, DAFM, Bord Bia, Origin Green and farmer organizations are all advocating similar actions at farm level and are all reinforcing the message on actions that will both reduce environmental impact and benefit the farm financially.

CHALLENGES

As the national sustainability plan for Ireland's food and drink sector, Origin Green faces a number of important challenges.

Sustainable intensification in the context of climate targets

At over 30 percent, agricultural emissions are the biggest contributor to Ireland's overall GHG emissions (EPA). This presents a challenging context for a national sustainability programme. The contribution of agriculture to total EU emissions is 10 percent,¹³ with agriculture's emissions share in Ireland significantly higher than in EU member countries. Ireland's larger proportion is due in part to Ireland's relatively small industrial base, but also to high production of meat and dairy products for export.

The concepts of sustainable intensification¹⁴ and efficiency feature widely in the Government's agri-food strategies and form the basis for much of Origin Green's farm

¹³ Eurostat.

¹⁴ The sustainable intensification of global agriculture is defined as increasing yields "without adverse environmental impact and without the cultivation of more land" (The Royal Society, 2009).

level programme. Garnett and Godfray (2012) discuss the issues around these terms and conclude that sustainable intensification should be pursued for a sustainable food system but as a complementary action to the other necessary measures: reducing food waste and losses, shifting dietary patterns, improving governance and the distribution of food. Indeed, Teagasc's work on the MACC and the EPA's analysis of the Government's agri-food strategy, would suggest the impact of farm level actions proposed by Origin Green will fall significantly short of Ireland's EU target of a 20 percent emissions reduction by 2020. Origin Green is not intended as a stand-alone plan to achieve Ireland's emissions targets, though it is likely to make an impressive impact on the emissions intensity of Irish agriculture. Complementary policies and programmes alongside Origin Green would be welcome additions to meet climate targets.

Demonstrate improvement on an aggregate level

Linked to the above, Origin Green must demonstrate an improvement in environmental impact across the entire agri-food sector. The immediate priorities for improvement are GHG emissions, biodiversity and water quality. Demonstrating a considerable impact will involve more ambitious action by farmers and companies alike and Origin Green's challenge is to realize this action.

Ensure effort across all members

Origin Green is a brand that represents the entire Irish food sector, with the aim of having 100 percent of food companies involved. Though companies will be at different stages of their sustainability journey, it is important, for the integrity and fairness of the programme that all companies are playing their part and improving the sustainability of their operations.

CONCLUSION

With 85 percent of food exports produced by verified members of the programme and the sustainability of 110 000 farms assessed to date, Origin Green has achieved impressive voluntary engagement across the Irish agri-food industry. It has done so through designing a programme that is informed by the market demands for sustainability and by gaining the buy-in of value chain actors on the benefits that improving on sustainability will bring to their farm or food business.

By focusing initially on areas where environmental and economic objectives overlap (e.g. efficiencies), Origin Green aims to make sustainability relevant to the farm or food business. The programme has broadened in scope, assessing other aspects of sustainability and requiring targets in various areas. It requires continuous improvement of participants and will continue to evolve over time in response to research developments and to consumer and trade customer sustainability priorities.

Stakeholder collaboration has been core to the programme's success. Stakeholder engagement on both strategy and technical aspects has helped to translate the ambition of Origin Green into a framework that is practical for participants and thus can enable change at scale.

Origin Green has taken a novel approach in developing a national programme that aims to both improve on sustainability and also give Irish producers an edge in the marketplace. The extent of the realization of these aims can only be evaluated once sufficient time has passed. The same is true of the evaluation of the approach the programme has taken. Early indicators, such as the large number of participating companies and farms, suggest that Origin Green has the potential to make an impressive impact on the sustainability of Ireland's food and drink production. With such a large number of participants, the level of data held by Origin Green will be instrumental in driving further change within the Irish agri-food sector and in informing national climate action strategy. These data will reveal the effectiveness of the approaches taken by Origin Green, thus providing valuable insights for other sustainability programmes.

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Consumer communication of product level sustainability information

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ABSTRACT

Consumer communication of product level sustainability information requires both (i) a profound measurement system that may also enable benchmarking and (ii) standardized systems in place to efficiently manage the provision and use of sustainability data along the value chain (B2B2C). This paper discusses the requirements for a harmonized system to communicate sustainability performance information at the product level. It provides an overview of existing standards and systems in place and calls for collaborative action to address the identified gaps.

INTRODUCTION

Accurate and reliable information on a product's social and environmental performance is ranking constantly high in consumer surveys. With its efforts towards "building a single market for green products" and its related "Roadmap to a resource efficient Europe" the European Commission (EC) has set forth an ambitious milestone: "By 2020, citizens and public authorities have the right incentives to choose the most resource efficient products and services, through appropriate price signals and clear environmental information" (EC, 2011). While there are undoubtedly multiple barriers of a social, economic and psychological nature, which result in the often-cited attitude-behaviour gap, there is also evidence that the provision of simple, trustworthy and comparable product sustainability information to increase consumer confidence would "encourage greater consumption of environmentally-friendly products across all behaviour groups, even if these products were somewhat more expensive" (EC, 2013).

This paper discusses the requirements for a harmonized system to communicate sustainability performance information at the product level. It begins with a brief overview on what is being discussed within the consumer goods sector with regard to relevant content for measuring product sustainability performance. The main part deals with the role of standards and information technology (IT) solutions for effectively communicating sustainability information. Finally, conclusions are drawn combined with an outlook.

MEASURING PRODUCT SUSTAINABILITY PERFORMANCE

Comprehensively understanding relevant sustainability issues of product categories and the actual performance of specific products, components and raw materials provides a clear view on the most relevant optimization and innovation potential. Moreover, it aims at enabling supply chain partners and consumers to base buying and consumption decisions

on robust sustainability information. However, owing to the great variety and complexity of social and environmental challenges, the design of a transparent benchmarking system poses a number of questions.

Companies and experts on the one hand agree that a comprehensive sustainability assessment needs to take account of a broad range of environmental and social aspects while considering the whole product life cycle. On the other hand, they argue that such an extensive and complex multicriteria approach will not make it into day-to-day business processes and decision-making.

An answer to this dilemma can be a clear focus on so-called “hotspots”. For each product category a comprehensive analysis identifies those aspects, processes and leverage points that are most relevant for the overall sustainability performance of a related product. These commonly identified hotspots are then translated into performance indicators (ideally not more than five to ten per category) that are easy to measure/report and allow meaningful comparison/benchmarking. If developed through a stakeholder-engaged sector-wide approach, such transparent results would offer great benefits to suppliers, manufacturers, retailers and – indeed with some further aggregation/simplification – to consumers. (see Figure 1).

Today it is widely accepted among leading retailers and brand manufacturers that a common understanding of category sustainability hotspots and related performance indicators would be of great value.¹ This is why in 2013 GS1 Germany partnered with think-do-tank Thema1 to identify and examine leading initiatives aiming for common category hotspots according to sector needs (GS1 Germany/Thema1, 2013). The list of initiatives included well-established business ones such as The Sustainability Consortium (TSC)², WRAP PSF³ as well as regulatory approaches such as the EU Product Environmental Footprint (PEF) currently being piloted by the EC (EC, 2016).

In addition to these developments, there are other initiatives such as the Standards Map developed by the International Trade Centre (ITC). As a neutral UN/World Trade Organization-body, it provides detailed and comparable “information on more than 210 standards, codes of conduct, audit protocols addressing sustainability hotspots in global supply chains” (ITC, 2015). This not only fosters a dialogue, mutual recognition or even possible convergence among the vast number of standards but it also serves as a valuable source for identifying category hotspots and effective indicators to measure them.

THE ROLE OF STANDARDS AND ITS SOLUTIONS FOR EFFECTIVELY COMMUNICATING SUSTAINABILITY INFORMATION

While the identification of relevant and meaningful indicators to measure and communicate sustainability performance has undoubtedly taken centre stage, there are a number of further requirements to be met in order to fully support supply chain partners and consumers in their decision-making. Most of these requirements relate directly or indirectly to increasing

¹ As, for example, clearly expressed by the Consumer Goods Forum and the GS1 Germany Sustainability Advisory Board.

² <https://www.sustainabilityconsortium.org>

³ <http://www.wrap.org.uk/content/product-sustainability-forum>

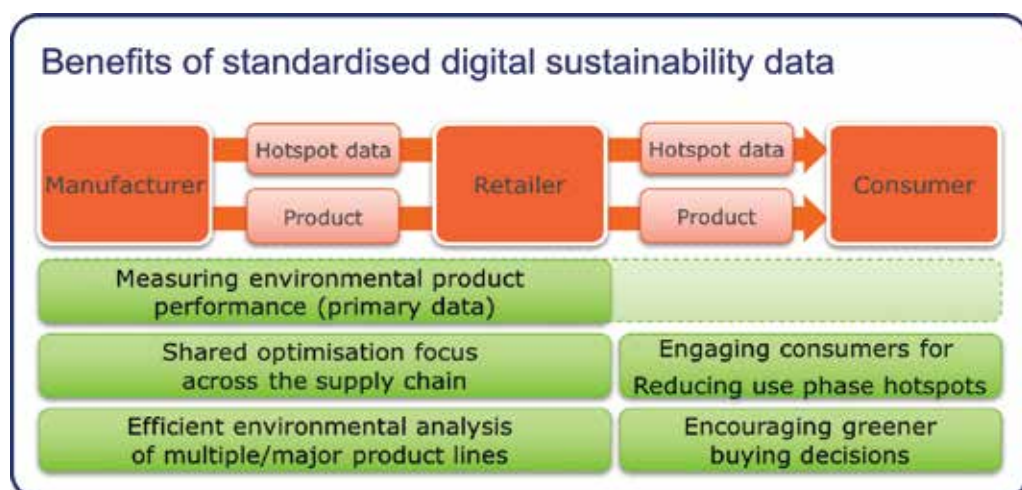


Figure 1. Benefits of commonly identified category sustainability hotspots

the efficiency of reporting and data exchange. Although sustainability can increasingly be found among the top priorities of corporate strategies, it is still regarded as an additional cost factor. Independent of the great value that accurate sustainability performance data provides, to succeed, systems need to be in place to drive out additional cost as well as the reporting burden of sustainability (information). In the following, the main requirements and existing solutions are discussed.

Identify: make sure to link information to the right product

Clear and unique identification of raw materials, components and especially final products is a key ingredient of a trustworthy communication system. Despite the enormous variety of consumer goods products, consumers need to be sure that they are receiving accurate product specific information. Ensuring that multiple information needs are related to an individual product requires a unique ID of every product; this is where the Global Trade Item Number (GTIN), which is globally unique, comes in as almost every consumer goods product sold in stores or online carries a GTIN that is on the barcode scanned at point of sale. The GTIN serves as a link to specific data and can as such also be linked to real time sustainability performance indicators.

Capture: enable efficient access to accurate/current data

Methods of data capturing are concerned with efficiently and accurately entering data or transferring it from one device to another. Barcode scanning is a very effective means of capturing identification codes such as the GTIN, as well as accessing related product data available in the system. Barcode scanning also has the added benefit of minimizing data capture errors. With the vast growth of smart-phones, the majority of global middle-class consumers today already have barcode scanning functionality right at their fingertips.

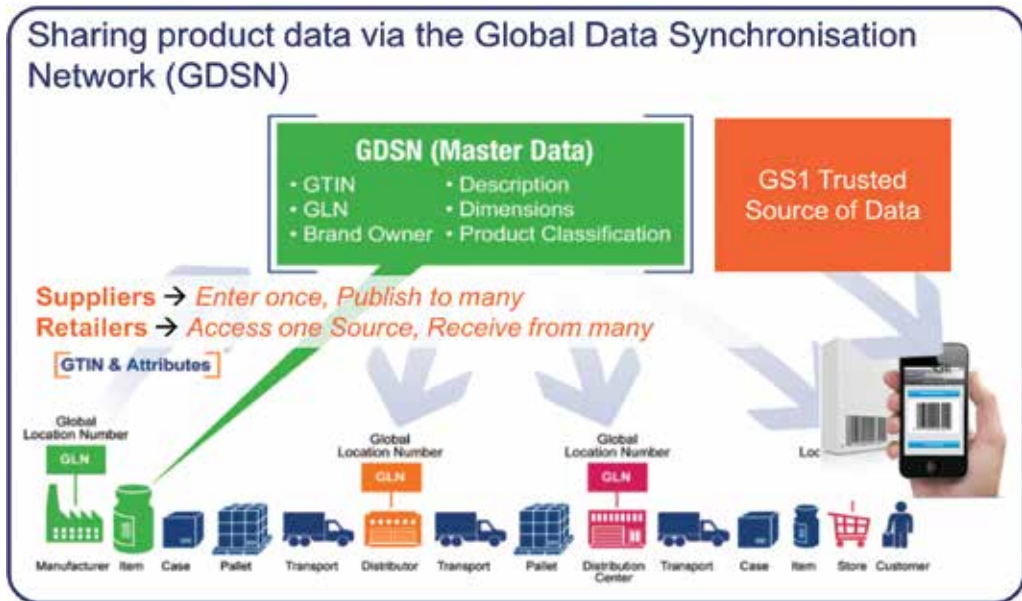


Figure 2. Sharing product data via the Global Data Synchronisation Network

Share: exchange standardized information with customers and consumers

Having clearly identified the related product by capturing the GTIN and linking to further product attributes, the sharing of specific performance data may seem to be the natural next step. What may be less obvious is the fact that the information on specific product performance needs to be standardized. Standardized data are critical for the seamless exchange of data between systems running on very different hard- and software configurations.

In the world of GS1 Standards data sharing is organized via the Global Data Synchronisation Network (GDSN). It allows suppliers and brand owners to enter standardized product data once and provide access to all their customers/retail partners. This enormous efficiency gain also applies to the retailers as they access a single data pool to receive the product master data of multiple products. Some product attributes are already shared with consumers, e.g. via smart-phone using the GS1 Trusted Source of Data (see Figure 2). Independently from the solution chosen, special attention needs to be given to the mechanisms on how to deal with sensitive data and to protect them from unintentional sharing and misuse.

While this information source for consumers already includes a number of relevant aspects, such as product claims and endorsements, origin information, nutritional information or information concerning usage and safety, there is still demand for more. In the digital world consumers engage with products via all kinds of sites and applications ranging from e-commerce, to social media, to lifestyle management. GS1 works with brand owners to manage their data in one place and syndicate them out to recipients such as Google, Twitter, Facebook and many more via an application programme interface (API). Jointly with the Consumer Goods Forum, GS1 formed a group called the “B2C

Information Needs Group (BING)”. It sets the direction for the consumer-centred attributes to be defined in the standard.

In addition to the efficiency benefits on the supply side, standardized product-level information also opens up further opportunities on the consumer side, for example filters. While it is hard to imagine that consumers first scan different product options and compare a number of attributes before taking a buying decision, it sounds far more realistic that “guiding” smart-phone apps offer the setting of personal preference filters. Scanning a barcode may then provide instant feedback to what extent this product meets the individual preferences (or what better options may be available in the store).

CONCLUSION AND OUTLOOK

As shown above, there are a number of basic requirements for effective consumer communication of product-level sustainability information. On the content side, we need to seek agreement on how to measure product sustainability. Such a measurement system needs to be scientifically sound and highly accurate while at the same time highly efficient in terms of low reporting burden. B2B hotspot methodologies such as those being provided by The Sustainability Consortium may serve as a role model on what a business-oriented solution may look like. As a normative and constantly moving target, sustainability calls for strategies based on resilience through diversity, continuous improvement, and trial and error. Any oversimplified consumer-facing hotspot-based benchmarking may therefore fail when it drives a sector too much towards equal processes and by that reduces room for creativity and sustainable innovation.

On the technical side, (global) standards to clearly identify products, capture information for higher efficiency and share relevant product master data with supply chains partners and consumers are among the core enablers for an efficient implementation of interoperable product-level reporting schemes. While these are well established in the consumer goods sector for data exchange among brand owners, retailers and increasingly towards consumers, further steps to better link upstream supply chain partners need to be taken.

In future scenarios of a more connected world and Internet of Things (IoT) applications we may even find more innovative ways to make sustainable actions the default value. In the case of laundry detergent, for example, product use is associated with the most relevant environmental impacts. Cleaning clothes with the right dosage and at the minimum temperature required for proper cleaning results are the two main drivers of keeping impacts at a minimum – and a common source for misapplication. Based on standards to identify, capture, and share an Internet-connected washing machine would identify the amount of clothes and the kind of fabrics to be washed and set the wash temperature, dosage and duration to match the particular detergent formulation/brand being used.

As shown in this paper, many requirements for providing consumers with simple, yet reliable and trustworthy product sustainability information are well on their way or already possible in existing standards. This journey will require additional efforts on all sides and among all stakeholders. However, responding to the enormous power of markets to request more sustainable products and services will be important and indeed should be well worth the effort.

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The Sustainability Consortium: theory of change and first result

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ABSTRACT

The Sustainability Consortium has brought together nearly 100 global consumer good companies and non-governmental organizations to develop a globally harmonized monitoring and reporting system for consumer products. Seven years after the start the tool is ready for 117 product categories covering nearly 90 percent of global sustainability impact of consumer products. The tool is mainly used to support buyers of retailers to measure sustainability of all the products they buy and based on that develop improvement plans with the partners in the supply chain. The paper introduces the tools and shares experiences on implementation with large global retailers.

INTRODUCTION

Consumer goods bring numerous benefits to society, dramatically improving lifestyles around the world. These benefits, however, come with an increasingly sizeable sustainability price tag – both for people and the planet. With increased population we must address the production, use and disposal of consumer goods. In order to have a sustainable world, we need to have sustainable production and consumption.

Progress has been made to make some consumer products more sustainable but it needs to expand to make all consumer products more sustainable. However, each product category has its own issues and understanding each supply chain can be very difficult.

The Sustainability Consortium (TSC), created in 2009, transforms the consumer goods industry by partnering with leading companies, non-governmental organizations (NGOs), universities and government organizations to define, develop and deliver more sustainable products.

THE SUSTAINABILITY CONSORTIUM

The Sustainability Consortium is a global non-profit organization that creates change through the implementation of its science-based, metrics-driven approach, and by collaborating with its broad membership base – which includes manufacturers, retailers, corporations and NGOs – and other stakeholders to drive innovation for a new generation of products and more sustainable supply networks (Box 1) (Arizona State University/ University of Arkansas, 2016).

Box 1: Mission of the Sustainability Consortium

To drive more sustainable consumer products through the design and implementation of credible, transparent and scalable tools and services that are science-based, stakeholder-informed, focused on impact, and accessible for all producers, retailers and users of consumer products.

Source: <https://www.sustainabilityconsortium.org/>

The science-based measurement and reporting system evaluated by numerous stakeholders enables users to improve transparency in their supply chains and make progress towards their goals for addressing key environmental and social impacts in product supply chains. With the increasing request for transparency by consumers' coupled with a reluctance to pay higher prices, stakeholders designed a simple, practical, collaboratively produced system to address both these imperatives that meets the consumers' demands as well as reducing the costs of investing in sustainability improvements to supply chains. TSC has brought together more than 100 global consumer good companies and NGOs to develop a globally harmonized monitoring and reporting system for consumer products. It is based in the science of sustainability – and supporting sustainable sourcing decisions of buyers globally. TSC's system covers between 80 percent and 90 percent of the sustainability impacts of all consumer goods. In each category, the most important material social and environmental issues are identified, wherever they may occur across the value chain.

TSC uses a market-based approach to drive change. If multiple retailers send the same market signal it is easier to make a bigger change. TSC has brought together members from across the supply chains in order to come up with a “one-stop-shop solution”. The system builds on the importance of the retailer–supplier relationship in driving change in modern supply chains. The retailers and the buyers of the retail play a crucial role in supply chains. So whatever you want to change in supply chains, whether sustainability or not, if you involve the buyers of the retail, those few hundred people will then decide what is in the shops; this can have a greater impact than along other parts of the supply chain. It should be supported by others including the pull from the consumer. However, the professional buyer can spend some time on investing in knowledge about sustainability and make choices about multimillion buying decisions; this can play a crucial role. It is one system that the buyers or the retailers can use, over all their product categories, to deal with all sustainability issues.

TSC uses science to identify the hotspots in different product categories' life cycles, alongside stakeholder engagement and strategic partnership with other leading sustainability initiatives to develop key performance indicators in the form of a manufacturer survey. TSC works within 117 product categories. For every product category, TSC has made an analysis of the main sustainability issues within that particular product category and where within the supply chain there is the biggest impact. Its starting point is a product category as it is defined in retail (chocolate, dairy, pork). For such a product category

TSC identifies hotspots. If, for example, 60 percent of all greenhouse gas (GHG) emissions are at farm level and only 5 percent in transport or packaging, it is no use to assemble a lot of information on packaging and transport, so we identify farm level as a hotspot and define improvement opportunities and indicators for that hotspot. For example, taking all the product categories that have GHG emissions at farm level, TSC identifies 10–15 hotspots. TSC then develops improvement opportunities for those hotspots and a list of 10–15 indicators per product category that can be used to measure the sustainability of the products within that particular product category that can then be used by any product that has that component.

TSC uses, wherever possible, existing systems. It stimulates innovation and continuous improvement though establishing a set of indicators that whenever a supplier does better in one of these 10–15 indicators they are rewarded, allowing TSC to measure the impact. The current indicators can already be used to measure performance of organic, local or any other type of food because we measure impacts such as GHG emission. These types of indicators can be used for all these types of food. There is no need for companies to develop new solutions to measure impact. If companies develop new innovative production methods, the impacts can also be measured with our current indicators.

In this way, one creates one system with indicators that can be applied globally and allowing companies to use the same systems, therefore making progress in the field of sustainability. It allows them to compare the score of their supplier with the average score and the industry average and therefore quickly assess where improvements need to be made to increase sustainability. As TSC has around 2 000 suppliers that have filled in 4 000 questionnaires, they have a great deal of data that can be used for benchmarking and identification of best practices so that it is easy to see how the relative score of the suppliers is in comparison with other suppliers.

CONCLUSION

TSC has only made a start; monitoring is not a goal as such, it is a start to see how suppliers are doing and is the base for starting to make improvement plans. It points to an objective way to see how your suppliers are scoring and start to assess the whole full supply chain, and thus develop a plan to make improvements and evaluate if targets are being achieved on time. It is not a system to say that you cannot deliver any more or to set a minimum level; it is a system of continuous improvement, cooperating across the supply chain to make supply chains more sustainable.

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Concluding remarks: sustainability in food value chains: how to get there?

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This workshop has been very rich in terms of issues considered, perspectives and ideas. Thanks to the presenters, discussions and especially to the chairs, for managing the sessions to have both breadth and depth in a very condensed schedule. This very density is an achievement in itself, an image of how sustainability should be considered, both in all its facets and oriented towards action. It also enables drawing some conclusions on how to operationalize sustainability in food chains, on what enables change and on possible ways forward for the programme.

HOW TO OPERATIONALIZE SUSTAINABILITY IN FOOD CHAINS?

The preparation of the Rio+20 Conference on sustainable development had been oriented by two key objectives: better integrate the three dimensions of sustainability and operationalize sustainable development, make it concrete, real. These two objectives are very linked, because on the ground the three dimensions are intrinsically linked. Any action, whatever its main objective, also has effects on other issues and dimensions.

To implement the Sustainable Development Goals (SDGs) we need to integrate the three dimensions of sustainability into action. And this where we need better understanding. We can make a description of sustainability issues in food systems at a global level, of how they link, or clash: growing demand versus planetary boundaries, number of hungry and of overweight. But to address them we need to go very down scale and there are some issues that cannot be addressed unless you go very deep and down in the systems. We cannot have a systems approach if we do not go where things are really linked, understand the relationships and interaction within and between systems, their dynamics and what interventions or actions are triggered in terms of responses and impacts in different domains. And so we need to enter this complexity, the variety of the systems, the interrelationship between the issues – because things are linked, and also because acting on one issue will act on another one.

Practitioners on the ground are confronted with the urgency to act, generally with a priority issue while at the same time having to take into consideration very different dimensions, often very far from their core expertise.

The purpose of this workshop was to explore how this diversity of issues could be taken into account. This oriented the design of the agenda, in order to offer a variety of entry points, and with a deliberate focus on issues that are often overlooked such as biodiversity

and social issues. It also oriented the selection of interventions from the numerous proposals received, in order to cover a broad range of issues, of actors and perspectives, including with some issues approached from different angles.

We had a very dense workshop with very different entry points and rich discussions opening up to other issues, bridging dimensions and scales, from local markets to global commodities, from very technical aspects to social impacts and governance. From the case studies and experiences presented here some important points have emerged: promising results as well as some key elements that enabled change.

There are already examples of initiatives with positive results on globally all dimensions of sustainability, including on some dimensions often overlooked such as social issues, gender and biodiversity. These examples are at very different scales, local, local getting very large like Campagna Amica, National like Green Ireland, or even global like the Banana Forum. This raises also the question of what can be done at what scale, in terms of quality and quantity. Of the trade-offs in terms of impact between quality and quantity, and also of the relationships between different scales. There are also many examples where acting on one aspect of sustainability has had other positive results. It is not always win-win, definitely not, there are trade-offs and there are also some unexpected synergies, expected results – economic benefits of trying to do something on biodiversity, gender benefits of trying to improve an economic aspect. Moreover, many of these initiatives also have positive nutritional impacts. And this is particularly important as the very aim of sustainable food systems is to ensure food security and nutrition for all now and in the future (HLPE, 2014).

WHAT ENABLES CHANGE?

A first point emerged from all interventions: it takes time. How to maintain momentum long enough to get results is crucial to success. And this has important consequences on what is needed, on how to keep the momentum to get results. And it is also very important when we consider public policies. They are changing quite often and it is not always easy to have projects going on for a long time within a changing environment. There are examples of projects going on with different types of support, adapting themselves.

A second one is the importance of collective action, coordinated action. Often transformation at one stage of the value chain depends on other stages. Decisions of one category of actors are driven by decisions of other categories of actor. Changes require collective action and action with very different categories of actors with big unbalances of power, different interests, different perspectives, and so governance is absolutely key. When preparing this agenda we had long internal discussions about having or not a dedicated session about governance but in fact governance is all over any initiative on such a scale as a food chain. So governance is key and among the important points mentioned are inclusiveness, transparency, a shared diagnosis, which enables identification of priorities. It also requires to better understand the interests of each category of actors as well as the cost and benefits of each potential action, and who is going to bear costs, and to benefit and how to share them. Involving all actors in monitoring can be an important lever to ensure long-term engagement and inclusiveness.

In some cases it was reported that there are very important actors of changes or drivers of changes at a certain moment, which have played a key role. But sometimes it was quite difficult to understand really what has triggered change, what precise action or measure. On the question what enables change, the answer was it was everything at the same time. So sometimes you have to do everything at the same time. And there would be value in having more documented examples over a long time where we know all the details, to better understand the dynamics at play.

Initiatives show different strategies to select priorities, either the most important or the easiest, low-hanging fruits and/or more consensual. And the latter may also be a first step, a way to show progress, build trust and thus capacity to address more difficult issues.

What emerged from all interventions is that a successful initiative is generally grounded on a form of identity, individual or collective, and then creates its own collective identity goals in order to be able to survive for long time and build the governance that is necessary. This is closely linked to social and cultural values. This shows clearly the need to better link with social science and behaviour, drivers of behaviour change – particularly for consumers. Ultimately recognition and valorization of the initiative by markets, consumers and public actors are key to its success in the long run.

Such considerations drive to identify the social and cultural dimension as a key driver of change, if not the driver of change towards sustainability, with the economic dimension making it, or not, possible. And there again, there is need to know much more on economics of changes towards sustainability, their costs and benefits and how they are shared. To a certain extent, to say it in a more provocative way, what is the business model of sustainable food choice and sustainable food systems? What makes it work for private actors who need to make money to be sustainable and for the consumers to make these choices? It was pointed out that it is often very difficult to address the question of how value is shared; this is the point where you begin to have conflict, and it is very difficult to have the information. Maybe one other economic way to look at it would be to look in a food chain or system at how risks shared, because it can be a way to protect the smaller farmers, to enable them to grow without being in a strictly value-sharing exercise.

WAY FORWARD FOR THE PROGRAMME

The last workshop, *Knowledge and Information for Sustainable Food Systems*, identified the critical role of knowledge, from different perspectives, different disciplines and different actors, of sharing knowledge between disciplines and actors. The challenge is to create a sustainable food systems scientific community, not only on conceptual and broad issues but also on very concrete problems and solutions. A workshop such as this one shows that it is possible, that it brings particularly exchanges. It also enables to identification of gaps, areas where more work is needed and scales at which to exchange to enrich these discussions. In that sense there is clearly a need to better understand social and cultural drivers, as well as economic constraints and determinants. Governance deserves to be considered in itself, at various scales. At this stage, and to facilitate the consideration of many different dimensions, as well as to better integrate cultural issues, there would be value in organizing such workshops at regional level.

REFERENCES

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The Sustainable Food Systems programme is catalysing partnerships among United Nations agencies, other international agencies, governments, industry and civil society to promote activities that can contribute to sustainable food systems. It organizes thematic workshops to share knowledge and experiences between academics, stakeholders and practitioners engaged in the programme. The two first workshops, in 2013 and 2014, were devoted, respectively, to *Voluntary Standards for Sustainable Food Systems: Challenges and opportunities* and to *Knowledge and Information for Sustainable Food Systems*.

The FAO organized, with UNEP, in June 2016, a workshop on “Sustainable Value Chains for Sustainable Food Systems”. The sessions of the workshop examined the potential contributions of the organization, functioning and governance of food value chains with respect to the sustainability of food systems. It aimed to better frame the notion of “sustainable value chain”. The various interventions approached sustainability by diverse entry points, from environmental to social issues, at very diverse scales, from local markets to globally traded commodities. Most of them show practical solutions and good practices as well as the conditions for their implementation. This publication is a compilation of the papers presented at the workshop, including a summary. It aims to stimulate reflection and exchanges among stakeholders and to facilitate the design of appropriate pathways towards more sustainable food chains, contributing to sustainable food systems.

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